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73 Amateur Radio

first ever!

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The IC-275A 2m multimode.

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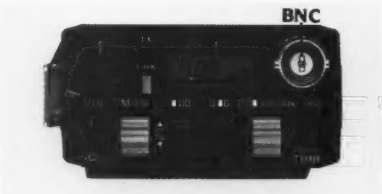

panel for easy readability, up to three watts of output (optional), 32 built-in subaudible tones AND wideband receive coverage from 138 to 162.995MHz in 5kHz steps for MARS/CAP operation and weather broadcasts. There's also a simple to use digital **TouchStep Tuning System** for fast shirt-pocket frequency adjustments. An IC-μ2A version is also available without DTMF and PL tones.

Accessories. The Micro utilizes most existing ICOM handheld accessories plus it hosts a new line of battery packs, long life to alkaline battery cases.

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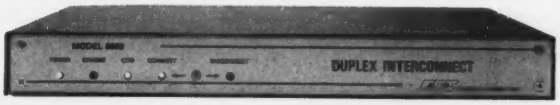
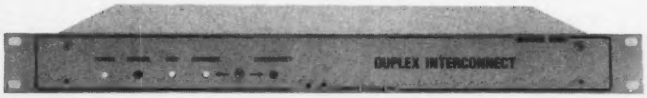
All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limting spurious emissions. μ2AT1186-3

MODEL 8000 DUPLEX





- Desk top or rack mounted versions
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- Half duplex privacy mode
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- Separate repeat level control
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28 dip switches make all features user programmable and selectable.

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8004 FCC registered coupler
8005 Centralized computer billing system

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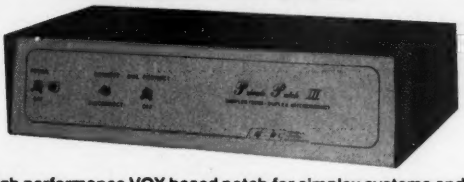

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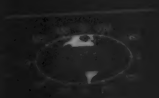

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All you need to operate packet radio is a MFJ-1274 or MFJ-1270, your rig, and any home computer with a RS-232 serial port and terminal program.

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↵24

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73 SOLD?

Henny-Penny called from California in a great dither. It seems that Dick Bash had bought *73* for $26 million and was moving it to California. Wow! I got so excited I started looking for a carton to empty my desk—well, a very small carton since I use a table for a desk so I can't lose things in my desk drawers.

Then a few niggling questions began to arise. Like where would Bash dig up $26 million? Or $26 thousand, for that matter? And how come I hadn't heard anything about all this, since I'm the only person who could make such a deal?

Let's see now, could Bash have conned twenty-six California millionaire hams into ponying up a megabuck each with a promise to award them the first twenty-six of the new *73* DX Dynasty Awards? That made as much sense as anything else. Or was this just another rumor invented by Brand X magazine to confuse the weak-minded? I had to admit that $26 million would come in handy—there's always a use for a little extra cash—even though $26 million doesn't go as far as it used to.

Brand X has been so busy that I've been thinking of starting a rumor-of-the-month award to send them, complete with a handsome certificate. Such creativeness should not go unrewarded.

Perhaps, just to keep things lively and contribute to the confusion, I should send a note to the other ham magazines, offering to buy them for, say, $10,000 each. Then I could get Henny-Penny to let the world know that I'm "dickering" to buy them.

On second thought, I don't need the aggravation, so to heck with it.

Speaking of Bash—Dick seems to have disappeared since the VEC program shot his scam down. Dick sure milked the hobby for all it was worth for a few years, changing the whole fabric of amateur radio by making it no longer necessary to have even the slightest technical understanding of radio to get a ticket. Heck, one little nine-year-old girl got her Extra-class ticket using his system! If Dick saved some cream off that milk he should be sitting back fat and happy.

One of the reasons I've had difficulty getting exercised over easy entry into amateur radio has been the pervasive cheating down through the years. Early on, thousands got their tickets by paying hams to take the FCC exams for them. Others found it cheaper to come in through the Class C gate—bribing a ham in the hinterlands to pass them, then "moving" from their fictional Class C address to their real address. Heck, the publisher of a ham magazine I could mention went this route.

How many Techs were given their tickets by friends? I even had one managing editor of *73* who came into the hobby this way. He was given his license without the faintest knowledge of code or theory. He got interested as a result and became a technical expert. He never did get far with the code.

Tens of thousands of phony Techs came into the hobby in the 60s. Most of them settled on two meters and many are still there. I remember one who made a good deal of money setting up repeaters and then selling them to the user groups which sprang up around them. Great technician, but as far as I know he still doesn't recognize his call on CW.

Now we're hearing stories of volunteer examiners selling licenses wholesale. Will this, as so many hams firmly believe, result in amateur radio becoming just another citizens band? That's a knee-jerk reaction—one I doubt

Continued on page 10

"I'm the guy you were talking to on two meters! Please follow me to our yacht landing for dinner!"

QRM

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- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **BC-2** wall charger for PB-21H
- **BC-6** 2-pack quick charger
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **BH-3** belt hook
- **AJ-3** thread-loc to BNC female adapter
- **RA-8A/9A/10A** StubbyDuk antenna
- **TU-6** sub-tone unit (TH-21AT/A only)

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TH-series transceivers shown with optional StubbyDuk antenna.
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- Built-in RF speech processor.
- SSB monitor circuit.
- Built-in digital display, (fluorescent tube), with analog dial.
- Narrow/wide filter selection on CW.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner/SWR/power meter.
- SP-230 external speaker.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
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- KB-1 deluxe heavyweight knob.

TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

- 160-10 meters, LSB, USB, CW, all Amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220 W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.

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QRX . . .

Number 25 on your Feedback card

EDITED BY PERRY DONHAM KW1O

$300 Ticket

IF YOU'RE HAVING TROUBLE getting that upgrade, think about a trip down to New York City. Word on the streets there is that licenses are currently going for $300. There's even a discount plan—if you bring in three other applicants, you get a free Advanced-class ticket. Bring in four people and you can walk away with that Extra-class ticket you've always wanted. We've been receiving lists of hams who allegedly purchased a ticket through this system (about 40 so far), and most of the new licenses seem to be General-class. I guess they're having trouble rounding up enough cheaters to get the discount.

Feet Feat

HARTLEY ALLEY NAØA has found a unique way to show off at his high school reunion. Hartley will be riding his bicycle from Boulder, Colorado, to Lynn, Massachusetts, taking two months to get to his 50th high school reunion. Alley's journey will take him through Colorado, Nebraska, Iowa, Illinois, Indiana, Ohio, Pennsylvania, New York, and Massachusetts. Along the way he'll be on the air mobile from his bicycle on two meters, using a speaker microphone and a half-wave rack-mount antenna. Hartley recently sold his bike shop in Boulder and claims that he's become quite bored in retirement. Hartley credits cycling for saving his life; he suffered what is called a "silent" heart attack during his years at the bike shop, not even realizing that it had occurred. His physician says that Hartley's constant cycling (about 100 miles per week) helped minimize the attack's damage. Hartley will be leaving for Lynn in May and expects to arrive there in late June; look for him signing bicycle mobile.

Hubble Help

YOU CAN BREATHE a sigh of relief if you just realized that you missed the deadline for the Hubble Space Telescope project. The launch date for the telescope has been shifted to the latter part of 1988; the new deadline for applications is June 30, 1987. The Hubble Space Telescope Amateur Astronomers Working Group is making time available on the orbiting platform for amateur astronomers. To apply, send $1 to HST Amateur Astronomers Working Group, c/o AAVSO, 25 Birch Street, Cambridge MA 02138.

Florida Info

THE HERNANDO COUNTY Amateur Radio Association of Brooksville, Florida, has come up with a nice idea. They've printed up information pamphlets covering ham radio in the state of Florida and have placed them in the state's welcome centers. The pamphlets list all of Florida's two-meter repeaters and traffic nets. You can get a copy by sending an SASE to the Hernando County ARA, PO Box 1721, Brooksville FL 33512.

Cable Cops

A REALLY SERIOUS PROBLEM is developing around the cable television industry in Israel. Even though the Israeli government has enacted legislation to license and regulate CTV stations, there are about 500 illegal systems in operation around the country, most of them using a home video setup hooked up to an amplifier and cheap coax running from building to building. Occasionally the Ministry of Communications sends commandos out to raid these pirate stations. A few months ago, such a raid in Kiryat Kotzkin resulted in the destruction of **Tzvi Pomer 4X4KT's** wire antennas. Tzvi complained to the Ministry and discovered that the raid had been carried out by operatives from the Federation of Film Distributors. Even though the Federation wouldn't admit to the action, they paid Tzvi what he claims is a fair compensation for his wrecked antennas. In Haifa, hams are afraid to be on the air since their signals interfere with the poorly engineered pirate systems; the hams fear retribution from what they term "shady underworld types."

Hartley Alley NAØA will ride from Boulder, Colorado, to Lynn, Massachusetts, for his 50th high school reunion.

Cat Caper

HAM RADIO figured prominently in the rescue of a man and his cat from their sinking boat in the waters near Miami recently. Timothy Stein noticed a foot of water in the cabin but couldn't find a leak; after the rising flood knocked out the boat's two-way radio, Tim turned to his ham set. **Fred Barfus** of Coral Gables picked up the distress call and relayed the message to the Coast Guard. Thirty minutes later, Stein and his cat Gray were pulled from the water by the *USS Aquila*. The rescuers reported that Stein was in great shape but Gray was a bit frazzled.

WAO Award

JUST IN CASE you've worked all of the counties in the United States, **Alan Harnois VE3LFH** has come up with the **Worked All Ontario** award. The certificate can be yours for working the 50 counties of Ontario (including our favorite, Peterborough County): You must have QSLs in your possession, but you don't have to send them in with your application. There is no certificate for SWLs. A map of the province is available from the provincial government; write to the Map Unit, East Building, 1201 Wilson Avenue, Downesview, Ontario M3M 1J8, or call (416)-248-3476 and ask for the Index Map of Southern Ontario. The WAO certificate is $2—send your list of counties worked to Alan at 400 Lafferty Street, LaSalle, Ontario N9J 1K6.

VEs Canned

FOUR ARRL Volunteer Examiners have been stripped of their duties after irregularities in testing sessions came to the League's attention. Fifty applicants have had their exams voided and their certificates of completion recalled due to the screw-up. Copies of the paperwork involved in the case have been sent to the FCC for review.

OSCAR's Up!

HERE WE GO AGAIN: OSCAR 10 is once more usable for communication. Even though the spacecraft can no longer be controlled from the ground, the mode B transponder has been stuck on and is providing excellent coverage. AMSAT engineers are optimistic that OSCAR 10 may survive for a while due to improved sun angles and the diminished possibility of long eclipses that would drain the craft's batteries. Writing in the *Amateur Satellite Report*, Editor Rip Riportella advises folks to get on and enjoy OSCAR operation while they can, and points out that new DX opportunities are arising every day. Be *very careful* to use low power (100 Watts erp maximum) to help extend the satellite's life.

Brando

REMEMBER ABOUT A YEAR AGO when we reported that Marlon Brando was living in Polynesia and using the alias Martin Brandeaux? Well, the press has gotten wind of the story and has completely botched the information. I shouldn't poke fun at another journalist, but this is so typical of the sort of reporting about ham radio that appears in nearly every paper in the country. WA6RBU sent this clipping in from Beverly Hills, and it contains gems like: "The actor uses a secret alias. . . and talks to ham operators around the globe—and they don't even have a clue who it is because the radio alters his voice!" and "Any shortwave operator who wants to call Brando should point his antenna 241 degrees clockwise due north from the east coast of the United States and about 209 degrees from the west coast." With press like that, we might as well all be on CB!

Thanks

OUR THANKS TO WA4BPI, WA6RBU, *Amateur Satellite Report, The ARRL Letter,* and W5VC for help with this month's column. Send your news and pictures to *73* Magazine, WGE Center, Peterborough NH 03458, Attn: QRX.

Paper Call

THE SIXTH ARRL Amateur Radio Computer Networking Conference is scheduled for August 29, 1987, in Redondo Beach, California. Hosted this year by the TRW Amateur Radio Club, the conference will feature papers presented by the leaders in packet technology. If you are interested in presenting a paper, you should contact Maty Weinberg at ARRL Headquarters, 225 Main Street, Newington CT 06111; (203)-666-1541 for an author's kit. Camera-ready originals are due at the League no later than July 27, 1987. Subjects being sought include transmission technology, networking and network expansion, applications, operations, message handling, international concerns, spectrum management, and the integration of voice, data, and images.

The "ham bands" now have a whole new meaning. "Shady Hill" from Jonesboro, Arkansas, is comprised of (l–r) Bill Shoe KB5ABI, Rick Lane KB5ADI, Carrol Lane, Tom Meridith K5MEA, and Norma Meridith WB5NZN.

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NEVER SAY DIE

from page 4

anyone has actually given any serious thought to.

If amateur radio had only forty channels instead of thousands, what might it be like? All we have to do is listen to the unholy mess in New York and Los Angeles on two meters to get a hint. I've monitored CB all over the country and I've never heard anything worse than two meters in L.A. Pardon me for getting the impression that putting down CB is a redneck reaction.

Ask me what entry system for amateur radio would work better than what we're doing now—or have done in the past. I've thought a good deal about this—have you? I'd like to see some ideas published in our ham magazines which would aim us at improving the entry—perhaps in a way which might help us get the hobby growing again. I'd like to see a system which would bring in a growing number of hams. Then it should present them with opportunities and incentives to grow.

The basic reasons for our hobby being licensed by the government are four—as stated in our rules. (1) To provide a resource of technically trained people in case of war. (2) To provide emergency communications. (3) To foster international goodwill. (4) To provide a medium for inventing and developing new communications technology.

There is an international requirement for understanding the code, but it is so weak that many countries have completely ignored it. Indeed, most of the two million ham licenses issued in Japan are no-code tickets.

Okay, the code... let's start at the beginning here. If we continue to have a first license which offers only CW allocations, we can stop bothering to give code tests. No one can operate on a Novice band on phone, so every Novice HAS to know the code to operate.

On that basis I would suggest ending any code tests. Instead I would make it so only established radio clubs could have VEC teams—that clubs be responsible for training newcomers in rules, theory, and operating—then have three licensed ham members examine the applicants. Once they get their Novice ticket they would have to show QSL card proof of actual operating—plus an additional exam on rules, theory, and operating—to get their General license. I'd do away with the Tech license as redundant.

Some will drop CW as soon as possible. Others will find they enjoy it and build their code skill. Once code is no longer a government mandated skill, I'll offer code proficiency certificates which can be won at hamfests and conventions and which will be prized proof of a unique ham skill.

In this day of sealed rigs (where the warranty is voided if you even try to fix a problem), it's difficult to get many amateurs to bother keeping up with technology. By encouraging amateurs to start building simple construction projects and graduating them to state-of-the-art computer and communications technology, I believe we can make technology exciting—fun.

It's interesting that what few youngsters we're attracting to the hobby these days do not seem to find today's technology any more intimidating than we old-timers did tubes fifty years ago. They're as familiar with ICs and UARTs as we were with modulated oscillators. A few old dogs have learned new tricks, but most are holed up, quickly thumbing past solid-state articles in the ham magazines, bewildered—too lazy to even try to cope with progress.

So, yes, I agree, if we open amateur radio completely—take all comers without any restrictions and dump 'em on the air—the result will probably be bigger pileups on two-meter repeater channels. We'd probably see the Los Angeles mess spreading to more major cities.

But, as it has in Japan, once congestion gets serious it would tend to push us to use more bands. Japan is going strong on 450 MHz and now moving to fill 1250 MHz—with many moving to even higher bands. Their 10-Watt limit on the lower bands has worked very well—allowing their equipment manufacturers to dominate the entire world—bringing hundreds of millions of dollars to Japan.

If we're still too proud to take a lesson from the Japanese, we deserve everything that's happening to us—in ham radio—lasers—cars—cameras—scientific instruments—telephone switching—hi-fi—cassette recorders—watches—computers—VCRs—video cameras—TV and so on.

Does the future of American technology lie in our ability to get amateur radio interesting to youngsters again? We know for sure that if we want to develop engineers we have to start 'em around 12 years old. How else but amateur radio? We also know the system we're using now isn't working—and the one Japan uses works fantastically.

So let's start discussing ideas—on the air and in letters to your ham magazines. We need ideas, not knee-jerk, redneck resistance to change. We want to not only keep our bands, we want to move ahead with new technologies—perhaps setting up world commu-

QSL OF THE MONTH

To enter your QSL, mail it in an envelope to *73*, WGE Center, 70 Rte. 202 N., Peterborough NH 03458, Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to *73*. Entries not in envelopes cannot be accepted.

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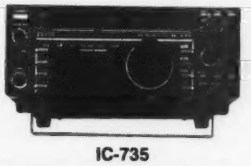
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nications systems via our own or even commercial satellites.

If we can start attracting youngsters again and if we provide the excitement and interest they need, we'll see them developing and pioneering new communications technologies, just as hams did until the Licensing Incentive Disaster of 1963 stopped everything.

We old-timers are still living on the glory of the long past—our development and pioneering of single sideband—our early RTTY developments—slow-scan television—narrowband FM—the parametric amplifier—the flying noise lock—double sideband reduced carrier—and so on.

Old-timers will remember amateur moonbounce work and meteor-scatter communications. Do you know that in the 60s Ray VK3ATN in Australia was making regular two-meter moonbounce contacts with U.S. amateurs with a huge rhombic antenna? I visited his station in 1966 and took pictures of his antenna farm from the air—amazing.

Now, with a marriage of computer and communications technology, we have more potential new modes of communication possible than ever before—we just lack the youngsters to experiment and pioneer them. Alas, without amateur radio as a source of such developments, they are unlikely to happen.

You see, even if we had plenty of engineers, we'd find commercial firms resistant to investing development funds in projects with much less than a 100% potential for bringing in a viable product. Big firms just don't like to take any chances, so they make sure the products their scientists and engineers are working on are sure-fire.

Unfortunately, really new technologies often are far from sure things. An amateur can afford to spend months to years designing something new. If he succeeds, fine, he has a chance at making money. If he fails, well that's the way it goes. The commercial scientist who fails soon becomes not just out of work, but unemployable.

If you think about it, most of the major breakthrough inventions have been made by amateurs—so we need amateurs if we are going to make any large strides in technology. The lack of youngsters in amateur radio over the last 23 years has stopped this valuable contribution to our country.

I'll tell you what. If you help me get amateur radio growing again, with lots of youngsters coming in—and if I manage to find an enthusiastic replacement for me to write editorials for *73*—then I might consider offers to buy the magazine. I'm 65 this year, which not long ago was the mandatory retirement age, so I worry about such things. In the meanwhile Bash can keep his $26 million.

A VISIT TO THE RSGB

My wife Sherry dropped a brochure from the Show of the Month on my desk a couple months ago. Amidst the listings of shows in Boston was a notice of a Thanksgiving trip to London. Hmmm. It left Thanksgiving eve and returned on Sunday, allowing three days in London, so not even a day of work would be missed. The price was $499—including round trip airfare, a first-class hotel (Hilton), breakfasts, and two London shows. How could I pass it up?

"$26 million doesn't go as far as it used to."

How could I visit London and not pay the RSGB a visit, right? Stu Norwood, *73*'s Associate Publisher, went on the trip, too, so he called them and arranged for my visit. The minimal instructions which filtered down to me were enough so I was able to muddle through and arrive on time.

I was fortunate that they had scheduled my visit for 11 a.m. instead of 10, as I'd asked. They're located quite a way out of London, so it took much longer than I expected to get there... about two hours. The taxi driver at the railroad station wasn't familiar with the RSGB, but he did know the road, so we found the building with no difficulty. I was surprised, knowing how well trained London cab drivers have to be to get licensed. Perhaps it's easier in small towns such as Potter's Bar.

I was supposed to visit a Mr. Rider, but apparently he was tied up. After a half-hour wait in the lobby, I was greeted by Dave Gough G6EFQ, who quickly showed me the headquarters station, the antennas on the roof, gave me a QSL card and shortcut directions to walk back to the railroad station. I guess everyone else was busy. It was a fine, brisk winter day, so the twenty-minute walk back to the station was invigorating.

Dave explained that unlike the ARRL, which has always been operated by paid operators, the RSGB depends on staffers with the spare time to keep the shack in shape and on the air. They've got a nice tribander, but a VHF antenna mast going up through it keeps it from turning. Most of the action these days is on VHF anyway. Perhaps when the sunspots bring more action to the lower bands they'll free up the beam.

On the way back to London, I suddenly realized I'd gotten so excited over seeing the RSGB HQ station I'd completely forgotten to buy the latest issue of their magazine.

The two shows were fun and visiting compact disc stores for my *Digital Audio* was a blast. It was a great, if short, London trip. Maybe, if they have another show tour to London next Thanksgiving, you can join me and go out to see the RSGB headquarters station and get your own QSL card.

USSR SCREWED UP TOO

The amateur radio situation in the USSR seems just as bad as ours—worse, considering their population as compared to ours. It's nice to see another major country being as dumb as the U.S. about something so important to its future.

There's no reason to expect the laws of nature to be all that different in the USSR—you get your best engineers and technicians via teenagers who get involved in electronic hobbies such as amateur radio and computer hacking. Thus the dying of amateur radio in Russia will have the same end effect it's having here—a loss of technology. Only Russia is in the even more serious position of further losing in its efforts to catch up with the West, since it's always been behind in technology. It couldn't happen to a nicer administration, right?

The more we encourage communist countries to fear amateur radio, the better our chances for seeing them just die away as the rest of the world sails past them in technology. So let's make sure they understand that amateur radio means people-to-people communications. The more we can get the Russian hams—what few there are of them—to talk with us and get off their boring signal report/QSL card shtick, the better.

Let's get after these turkeys and get them to behave like live people instead of tyranized slaves. Ask them to tell you about their work—about their town—flatly refuse to give them a signal report until they talk with you. Ask them how their weather has been. Heh, heh... ask about their crops—probably a state secret.

There are still around 5,000 collective ham stations—club groups. These are about all we'll hear—the other 5,000 or so Russian hams are mostly on VHF where they can't get into trouble talking with foreigners. This keeps down the number of monitoring stations it takes to check on 'em.

Like the U.S., Russia has let most of their school radio clubs die. Today there are only about ten active school ham stations in Moscow out of 1,200 schools, according to the *W5YI Report*.

You might want to keep an eye on *Newsweek* for any Russian news of interest which you can bring up while you're in QSO with Russian hams. I'm sure they will be delighted in your interest in their country—in discussing the latest news of persecuted dissidents—in the problems Jews who want to leave are having—building that gas pipeline to Europe with slave labor—the deadening effect on their lives of the ubiquitous lines for food and clothes—the housing shortage—everyday things like that.

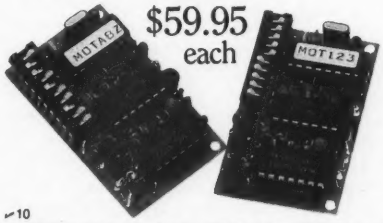
Of course you should be prepared to frankly answer questions about the legions of homeless, jobless, starving Americans desperately wandering the streets of our cities and the hopeless plight of our persecuted blacks and Hispanics.

Yep. One of the basic reasons amateur radio has some of the most valuable shortwave frequencies allocated to it is for establishing people-to-people communications between countries—international friendships. Now let's be honest about this—have you been living up to your responsibility according to our rules and regulations? And, no, swapping a signal report and QSL does not even

Continued on page 62

Dynamite Discovery

Communications Specialists' latest excavation brings to light yet another dynamite discovery—our new dip switch programmable SD-1000. No need to tunnel your way through Two-Tone Sequential decoding anymore. We've mined this amazing unit! Now, for the first time, you can stock one unit that will decode all calls in a 1000-call paging system with ±.2Hz crystal accuracy. The EEPROM onboard memory can even be programmed for custom tones, and every unit includes group call. Universal switched outputs control your call light, squelch gate and horn. The SD-1000 can also generate CTCSS and decode Two-Tone Sequential. Its miniature size of 2.0″ x 1.25″ x .4″ is no minor fact either, as it's a flawless companion for our PE-1000 Paging Encoder. We ensure one-day delivery and our one-year standard warranty. Tap the rich vein of Communications Specialists and unearth the SD-1000 or other fine gems.



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IC-751A REVIEW REPLY

1. The IC-751A is built on IC-751 technology and is not similar in circuitry to IC-735. IC-751A main board is redesigned.

2. The IC-751A uses blue/red *fluorescent* display. (IC-701 had LED display.)

3. A) IC-751A uses the same CPU as the IC-751.

B) Program storage is identical in IC-751/751A.

C) See ICOM Talk "One Step Beyond." ICOM radios *do not* go dead in five years, requiring return to factory for reprogramming.

D) Only IC-745/751/751A/R71/271/471/1271 have exchangeable RAM card.

4. IC-735 *does* have a heat sink. It has a large, built-in heat sink with a squirrel cage style fan. IC-735 and IC-751/751A have similar temperature/fan speed characteristics.

5. IC-751 does not have thermal drift problem. Extra sensor is provided to improve component life where *internal* power supply is installed and radio is operated for extended periods of time in receive.

6. High noise blanker settings *do not* cause distortion of CW signals. Noise blanker operation requires proper settings where distortion may be caused by particular band conditions with noise blanker use.

David Smith
ICOM America

DX DYNASTY—NO!

Was excited about award until saw "QSL cards are not required for the DXD Award." Totally ruins award's value—No thanks, I'll stick with DXCC.

Ken Kopp K0PP
Anaconda MT

The idea behind DXDA is to give people a chance to have some fun working DX again. We want to get your heart thumping when you hear an almost-rare prefix—even if you've worked that country dozens of times in years past. How much fun can you have if you're working only one or two new ones a year?

We're not naive, Ken. There are slimeballs out there who will abuse the "no QSLs" rule, but that hardly affects the award's "value." We're not trying to be like DXCC, we're trying to offer an alternative to it.

The DXDA's "value" is $6, plus whatever pride the person who earned it takes in the accomplishment. If you earn it fair and square, it's worth something to see that piece of paper reminding you of the work and the fun you had getting it. If you somehow manage to fake your way to DXDA, please remember that we just sold you a piece of paper for $6.—KA1MPL

NEW HAM IN CHINA

I'm a new ham and my name is Chang-Han Dong. There are only 15 amateur stations in China, two of them in Shanghai, they are BY4AA and BY4AOM.

You know that the equipment of communication is very expensive, so I want to make a receiver (amateur band, SSB, CW, etc.) to use. Some time I knew of two articles in your magazine but I have not any way to look for your magazine in Shanghai, so I haven't the whole articles.

I think, you may help me... Thank you very much. I hope to see you on the air. 73!

Chang-Han Dong
Shanghai
People's Republic of China

Welcome to the hobby, Chang-Han Dong! The articles are on their way to you and we hope they will help. Perhaps your letter will inspire some of our readers to write you with encouragement. (The address: Institute of Estuarine & Coastal Research, East China Normal University, Shanghai, The People's Republic of China.) For more on China, see under Roundup in 73 International in this and last month's issue.—Eds.

DX DYNASTY—YES!

Your new DX Dynasty is a good idea. May I suggest you not only continue this but that you consider starting an annual version. Being a free enterprise magazine rather than a League-affiliated one, you are in a position to defer your expenses by charging a filing fee for a yearly contest. Why not a separate DX contest for Novices ONLY? You have unlocked a plethora of interesting ideas.

H. Wayne White KB5NO
Hereford TX

DX DYNASTY—YES,YES!

I am glad to see someone finally do something constructive regarding DX-100. I just qualified for ARRL DXCC and it cost me a fortune to get the QSL cards. The Bureau is only 80% useful under ideal conditions. Now I can start anew in 1987 and have the fun of earning DXDA without all the hassle of trying to get cards.

Carole Perregaux KA1FVY
Trumbull CT

RUSSIANS AND BEARCATS

Thank you for publishing Bill Pasternak's and Robert Horvitz's commentary on the Electronic Communications Privacy Act [*73*, Looking West, January, 1987]. As a ham and SWL, it is ludicrous for anyone to assume that it is possible to place restrictions on what may and may not be listened to on a multiband scanning-type radio. Talk about eavesdropping—ever go down Embassy Row in Washington, DC? Check out those strange antennas on top of the Soviet and Soviet-block embassies. They certainly don't care about the ECPA, and I am sure they are not using them to chase DX on 20, either! I feel that our tax dollars would have been better spent on going after the KGB operating out of the United Nations rather than the American public using their Bearcat scanners in the privacy of their own homes.

George Primavera WA2RCB
Cherry Hill NJ

PERPETUAL MOTION

I just want to tell you how important the article by Irving Gottlieb happens to be ["No Free Lunches," *73*, November, 1986]. Most articles of this sort are cynical. The occasional exception tends to be by enthusiasts who blindly endorse work that clearly requires a highly skeptical review.

Gottlieb has shown the rare capability of pointing out delusions with regard to "free-energy" machines while retaining an open mind toward the possibility that there may always be something new under the sun.

This Institute has been following machines of this type for a decade. During the last year, numerous anomalies strongly suggested that it may prove possible to extract energy from the universe in ways that have previously eluded us.

Mark Goldes, CEO (Ex W2VRC)
Aesop Institute
Sebastopol CA

SMELL THE FLOWERS

I am not one who normally writes letters to the editor or publisher of anything, but in this case I thought I must because I have never enjoyed reading a magazine as much as I did your copy of December, 1986. You say, why is the December issue any different from any other issue? As far as I can tell, it's not any different; it's just that I have finally taken the time to read your magazine. Up to this time, I thought all ham radio magazines were the same. I would buy one with the idea of looking at all the ads and for any building projects I might want to try and put together and that was it. I would never take the time to read it through. You can bet I will read it through from now on. I wonder how many other people have done the same thing in the past and missed your good magazine. As they say, you should take the time to smell the flowers along the way.

Don Lallier WA1ULQ/0
Blair NE

NOVICE CLASS IDEA

I teach Novice classes here in town and advise all to subscribe to *73*. I think with the next class I will build a subscription into the fee for the class. Every issue is worth saving.

I'd like to see the code stay with the ham test, but maybe as a one-time deal, like 10 wpm for all levels.

Bill Jones N5DOX
Abilene TX

That first thought of yours, Bill, is great! So great that we don't need to mention again the need for a no-code license.—Eds.

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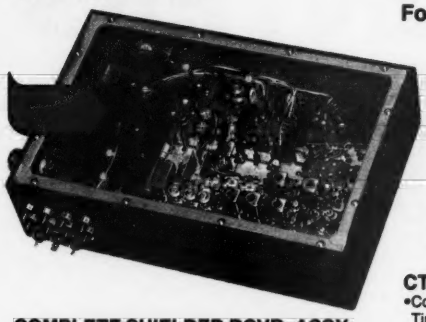

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Receiver Front-End Preselectors

- **FL-6: 6Hi Q Resonators with Lo-Noise Transistor Amp (2M or 220 MHz)**
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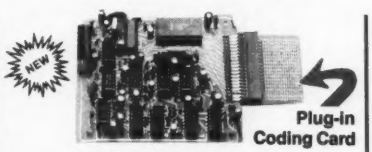
- **SCP512** 12 VDC @ 1A & 5VDC @ 0.4A out. (1.1A total max. out.)
- **SCP512A** As above, but also w/ −12VDC @ 0.1A



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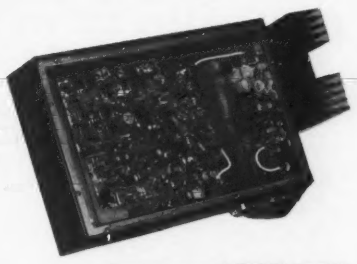
- 30A @ 70% duty, 25A @ 100% duty.
- Massive 30 lb. Transformer & Heat Sinks.



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- Withstands High VS WR
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- Spurious − 75 dB. Harmonics − 60 dB.
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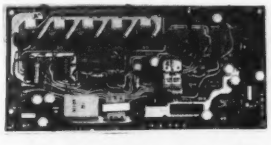
- ***SCT110 mounted in shielded housing***
- Same as used on SCR 1000 & 2000X
- Completely assmbld. w/F.T. caps, SO239 conn.
- 10, 30, or 75 Wt. unit.

SCT 410B UHF Transmitter Bd. or Assy.

- Similar to SCT110, 10 Wts. nom.
- ***Now includes "on board" proportional Xtal Osc./Oven circuitry for very high stability!***
- **BA-40 40W. UHF AMP. BD. & HEAT SINK**



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- Provides all basic autopatch functions
- Secure 3 Digit Access; 1 Aux On-Off function, Audio AGC; Built-in timers; etc. Beautiful Audio!
- 0/1 inhibit bd. also available
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- Includes land-line "answering" circuitry

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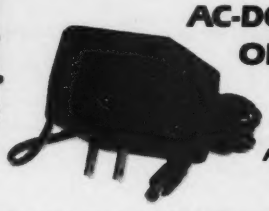

#AC-1200 AC ADAPTER CHARGER

#1200H 1.2 GHZ

Small enough to fit into a shirt pocket, our new 1.2 GHz and 1.3 GHz, 8 digit frequency counters are not toys! They can actually out perform units many times their size and price! Included are rechargeable Ni-Cad batteries installed inside the unit for hours of portable, cordless operation. The batteries are easily recharged using the AC adapter/charger supplied with the unit.

The excellent sensitivity of the 1200H makes it ideal for use with the telescoping RF pick-up antenna; accurately and easily measure transmit frequencies from handheld, fixed, or mobile radios such as: Police, firefighters, Ham, taxi, car telephone, aircraft, marine, etc. May be used for counter surveillance, locating hidden "bug" transmitters. Use with grid dip oscillator when designing and tuning antennas. May be used with a probe for measuring clock frequencies in computers, various digital circuitry or oscillators. Can be built into transmitters, signal generators and other devices to accurately monitor frequency.

The size, price and performance of these new instruments make them indispensible for technicians, engineers, schools, Hams, CBers, electronic hobbyists, short wave listeners, law enforcement personnel and many others.

STOCK NO:

#1200HKC	Model 1200H in kit form, 1-1200 MHz counter complete including all parts, cabinet, Ni-Cad batteries, AC adapter-battery charger and instructions	**$ 99.95**
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#P-100	Probe, direct connection 50 ohm, BNC connector	**$18.00**
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ICOM IC2AT/12AT ICO2AT IC-03/04AT IC-A2/U16

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Yaesu FTC 1123, FTC 1143
ICOM IC-M5 (Marine) M700
Tempo M-1

TS440S/AT, R-5000, R-2000, TS-940 S/AT, TM-201B, TR3600A, TM-2570A/50A/30A, TR-751A Kenwood Service/Repair, TH 21/31/41 BT, TM-211A/411A, TS-711A811A, TM3530A, TH205AT, TH215AT.

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NEW PRODUCTS

Number 21 on your Feedback card

Telvac basic service kit from Jensen Tools.

JENSEN TELVAC TOOLS

Jensen Tools has introduced a new service kit for the budget-minded electronic technician. The kit contains 40 high-quality hand tools housed in a wood and vinyl case with removable pallets, a document pouch, and lockable latches. The tool selection includes screwdrivers, pliers, nut and hex drivers, punches, wrenches, soldering equipment, a hemostat, reverse-action tweezers, and other specialty items.

For complete details on Telvac economy tool kits or a free catalog of Jensen tools, please check Reader Service number 203.

THL HL-2K/A

Tokyo Hy-Power Labs has introduced a companion to their HL-1K/A linear amplifier. The HL-2K/A is built around a set of 3-500Z transmitting tubes and is compact enough to fit into any shack. The power supply is built in, and two large front-panel meters monitor plate current, grid current, power output, and plate voltage.

For more information about THL amps, check Reader Service number 208.

VALOR 2 PLUS 2

Valor Enterprises has introduced the 2 plus 2 antenna for amateur radio operators. This dual-band antenna is 1/4 wave long on 2 meters and 1/2 wave long on 70 centimeters with under 2:1 vswr on both bands. The antenna comes with a magnetic mount and is rated at 100 Watts.

For more information, check Reader Service number 211.

SUN-FLEX SCREENS

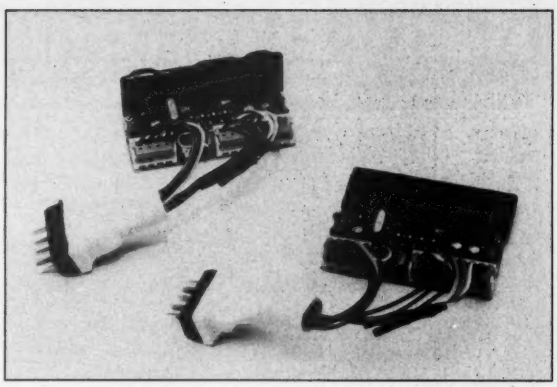
Sun-Flex now offers anti-glare filters for CRTs that also improve contrast by blocking diffuse reflections from bright walls that could wash out displays. These matte black microfiber filters provide a shadow-box effect and fight glare using the same principle used in Venetian blinds. The snap-on screens are available for both monochrome and color monitors.

For more details, please check Reader Service number 212.

CSI CTCSS

Communications Specialists is expanding their line of CTCSS tone boards to include two adapter kits for Standard and TAD USA hand-helds. The Standard 734L/834L may now be fitted with a TS-32HBL low-profile encoder/decoder using an 01-1030 adapter plug. The TS-32HBH high-profile encoder/decoder now fits the TAD M1520-454 by using an 01-1031 adapter plug.

For a complete catalog of CTCSS products, check Reader Service number 210.



Communications Specialists CTCSS boards and adapters.

FREE HEATH CATALOG

Heathkit's new Winter '87 catalog is out, featuring many new projects for the electronics hobbyist. One addition is the IM-2320 Digital Multimeter kit; the unit's single rotary switch selects voltage, current, resistance, or capacitance measurements. The new catalog lists over 400 kits and accessories—to receive a free copy, check Reader Service number 207.

Heath's latest catalog is out.

CENTURION BATTERIES

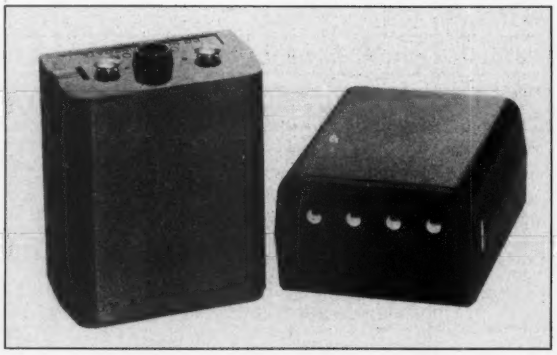
Two new battery packs are available from Centurion International for radios from King. The KR0105 is a 9.6-volt, 800-mAh rechargeable nickel-cadmium set, while the AL0514 is a 13.5-volt, 2,100-mAh throw-away alkaline pack.

You can get information on both of these new batteries by checking Reader Service number 206.

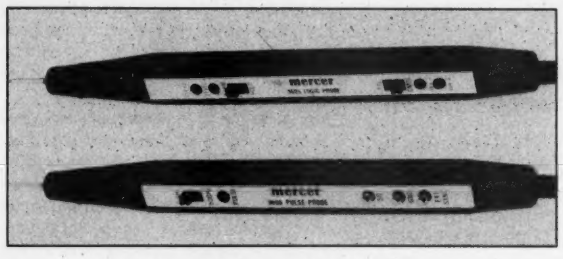
SIMPSON PROBES

Two new logic probes and a new pulser probe are now being marketed by Mercer Electronics, a division of Simpson Electric. The model 9604 (20 MHz) and model 9605 (50 MHz) logic probes come in a slim case and are useful for troubleshooting both TTL and CMOS circuits. Levels and pulses

Tokyo Hy-Power Labs' HL-2K/A linear.



Two new battery packs from Centurion.

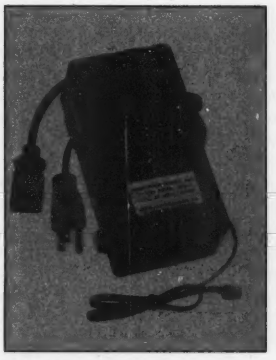


New logic probes from Mercer.

can be observed on two front-mounted LEDs; both models feature a pulse memory.

The Mercer model 9606 pulser can inject 50-us pulses into a logic circuit without the need to isolate ICs. It also has a sync input to allow the use of an external synchronizing signal.

To learn more about the Mercer line of DMMs, digital capacitance meters, and hand-held test instruments, check Reader Service number 209.



Multi-threat protection from Electronic Specialists.

ELECTRONIC SPECIALISTS STATIC CONTROL

Electronic Specialists announces the MPS(22)-2 portable computer protection system for the personal computer on the go. The unit subdues ac power line spikes, electrical noise, modem line spikes, RFI, and static problems. It provides standard and CEE-22 electrical sockets, standard phone RJ-11 modular socket/plug, and a static discharge plate. For more information, check Reader Service number 215.

JENSEN ULTRATORCH

The Ultratorch, available from Jensen Tools, is a compact, cordless combination soldering iron, flameless heat tool, and torch. Its temperature can be adjusted from 394° to 2372°, making it useful for everything from soldering to welding. Soldering/heat ejector, torch ejector, tapered needle soldering tip, heat tip, solder sponge, tip cleaner, and spanner wrench are all included. For more information or for a free catalog, check Reader Service number 216.

LARESCO CODE SOFTWARE

LARESCO has introduced Morse: The Code Machine for the Apple II+/c/e. The program has 31 modes, including frequency selection, special signals send mode, extended sound spacing, and more. The 32-page manual supplied with the program contains lesson plans and methods for learning and enhancing code skills. Also included are graphics, a word processor, and speed ranges from 1–100 wpm. Six versions of this program are available, ranging in price from $29.95 to $89.95. For detailed information, please check Reader Service number 214.

ACE AR-2002

ACE Communications' AR-2002 scanning monitor receiver offers continuous coverage from 25–550 MHz and from 800–1,300 MHz. Other features include 20-channel memory scan, priority scan, band search, multimode reception, selectable frequency steps, and a bar-graph signal-strength indicator. The AR-2002 uses a 750-MHz i-f, high-level double-balanced mixing, and a low-noise, wideband rf amplifier for peak performance.

The ACE model AR-2002 scanner.

The ACE AR-2002 retails for $499; for more information, check Reader Service number 204.

DAVLE CATALOG

Davle Tech's new 36-page catalog of tools and equipment for electronic and telecommunications manufacturing, field service, laboratories, schools, and hobbyists is available direct from Davle Tech. Check Reader Service number 205.

New catalog from Davle Tech.

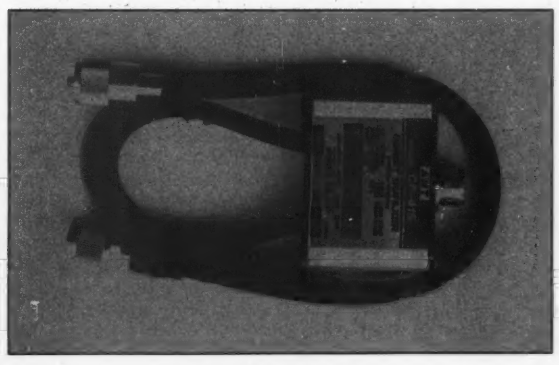
NCG DUPLEXERS

Two new duplexers are available from NCG Company. The CF-415 provides the dual-band operator an extra degree of safety with its high-power capabilities. It safely handles 500 Watts on HF, 400 Watts on 145 MHz, and 250 Watts on 450 MHz. The isolation on both bands is more than 50 dB.

The CF-412 has a very broad frequency range—1.3–450 MHz on the low input and 900–1400 MHz on the high-frequency side. Maximum power is 70 Watts, with isolation more than 39 dB.

You can get information on both of these duplexers by checking Reader Service number 217.

The Ultratorch from Jensen Tools.



NCG's CF-415 duplexer.

73 Review

ICOM IC-275A 2m Multimode

by Peter H. Putman KT2B

ICOM America, Inc.
2380-116th Avenue NE
Bellevue WA 98004
Price class: $1,200

Number 7 on your Feedback card

When *73* called and left the message that "an ICOM IC-275A 2-meter radio just went out by UPS for review," my first thought was: Oh, nuts. Another 2-meter multimode with lots of bells, lots of whistles, a pretty display, and the usual sub-par receiver performance specs. Was I ever wrong!

After extensive testing and on-air use, all I can say to the 2-meter minions is "Keep the faith, baby!" ICOM has been listening to your suggestions and complaints, and their answer is the 275A, a truly high-performance 2-meter multimode for the amateur market. For the first time, you can wrap your fingers around the VHF equivalent of the IC-735 HF radio. . . both in size and in operating features.

This transceiver is a radical departure from ICOM's previous 2-meter designs. The front end is a 3SK121 GaAsFET driving a dual balanced mixer consisting of a pair of 2SK125s, which incidentally is pretty much the "hot" front-end scheme for HF radios nowadays. The dual-conversion scheme allows for the use of an optional narrow CW filter, in addition to passband tuning and a superior adjustable notch filter. Receiver coverage is from 138–174 MHz, allowing reception of MARS, CAP, police, fire, and other municipal services, as well as the 2-meter band.

The transmitter lineup is fairly conventional, running 25 Watts output (adjustable down to 2 Watts) in FM, USB, LSB, or CW. The big improvement here is the massive internal heat sink encasing the PA compartment and power supply. (Yes, the power supply is built-in and runs off 117 V ac.) The usual complement of memory controls is available along with some special twists, and all the necessary adjustments, such as RF GAIN, MIC GAIN, AF TONE, DELAY, and RF POWER are accessible from the front panel via unique push-to-enable and push-to-disable controls.

The 275A is configured with dual vfo's and has a separate memory storage area for 99 different frequencies. You can also store any—and I mean any—desired offset in each memory channel as well as a PL tone on transmit and the desired mode. Offsets can be dialed up from the main vfo knob as well as from standard PL tones. Once you've configured the desired channel information, you just send it to a memory for safekeeping.

Being able to store the mode on each memory channel allows the use of a MODE-SCAN switch, which will scan only those channels whose operating mode corresponds to the front-panel mode selection in use (e.g., if you are currently in USB, only similar memory channels will be scanned). Or, you can scan all of the channels with the more conventional SCAN control. Two pre-defined limits can establish a PROGRAMMED SCAN routine—say, all channels between 146.000 and 147.000 MHz—and channels can even be designated in such a fashion that they will be bypassed during SKIP SCAN operation. These features alone should keep scanner freaks busy for a few months.

The dual vfo's run independently and can be equalized or their contents sent to a memory channel quite easily. As if that wasn't enough, you can also designate a CALL channel (other manufacturers call this a PRIORITY channel), which the transceiver will check on every few seconds during normal scanning operations. The vfo's can also be split if desired, but I can think of only one use for this function, and the repeater offsets take care of that quite nicely. It goes without saying that the display frequency can be locked, and the tuning dial accommodates multiple tuning rates depending on the mode selected.

For FM mode, these rates are 5 kHz and 1 kHz per step, while in weak-signal modes (USB, LSB, CW) the rates are 1 kHz and 10 Hz per step. To anticipate your next question, yes, ICOM has incorporated an RIT circuit allowing excursions of up to 9.9 kHz above or below the displayed frequency. This might be useful if you happen to be working someone with an older tube-type vfo rig who is blissfully galloping up and down the band. (You never know when one of those old HW-20 "Pawnee" rigs might show up!)

Operating modes are selected from the front panel. Depressing the desired button results in an audible "beep," which I find somewhat annoying but tolerable. You can disable this function via an internal control, however. Depressing the CW switch twice will activate the optional CW filter, which is either 250 Hz or 500 Hz depending on whether you read the owner's manual or the latest ICOM advertisements. Such a filter would come in handy during moonbounce operations or when severe QRM is present, such as during a contest.

Also enabled from this area is the built-in noise blanker, which gives adequate results for the more common forms of line noise usually encountered during the winter months. A compressor option is built-in, although I didn't have a chance to try it out. Provision is also made for a mast-mounted preamplifier option (model AG-25) to be controlled from the front panel, and the agc time constant is also selectable here. AF GAIN and SQUELCH sensitivity controls are located to the left of the mode switches, while the PASSBAND TUNING and NOTCH controls are located to the right of the front panel by the RIT and A=B controls.

Just below the main panel you'll find a row of controls with their shafts fully recessed. Depressing any of these shafts results in an "on-off" toggle operation, and the control shaft emerges for adjustment. You can set up the microphone gain, rf gain, power output, and delay on the CW transceive line. A tone control is also provided, continuing a tradition started on the IC-740. (I usually leave it in the full treble position.) The meter can select either relative signal strength in S-units (weak-signal modes) or function as a discriminator meter in FM mode. During transmit, it will either display ALC settings or rf output power.

Provision has also been made for the usual SPEECH module for aural reinforcement of control and frequency settings. (These things must be all the rage in Japan!) This can truly be classified as a bell-and-whistle function, as it serves no other useful purpose.

Two other controls, however, serve very useful purposes: first, the DATA switch, which allows extremely fast TX/RX switchover for AMTOR and packet-radio operation. ICOM claims that a newer synthesizer design allows for lockup in just five milliseconds, and the offshoot of this is the second notable control, CW BK-IN, the break-in setting. This is the first 2-meter multimode I've used with full break-in on CW, and is it a joy to use! You can also select semi-break-in or conventional switched TX/RX operation if desired.

A standard SO-239 connector is used for the antenna. The ac power cord fits into the 3-pin socket at the left of the rear panel, and if you want to use a separate dc supply, the access is through the connector behind the large plastic plug at the rear center. The CW key connection is at the lower left, and the CW BK-IN slide switch is to the immediate right of it. CW sidetone can be adjusted from the rear panel, as can the compressor level and (of all things) the microphone tone. The front-panel meter also displays swr and is set up by the rear-panel switch marked TX METER. An external speaker jack is also provided.

Rounding out the rear-panel connections are two multi-pin connects marked ACCESSORY and AQS. The former allows access in the same manner as the old 24-pin MOLEX connectors used on the 740/745/751/251/271 series of radios to various monitoring and keying functions and permits ALC control of an outboard linear amplifier. Used in conjunction with the optional CT-15 AQS adapter, the AQS (Amateur Quinmatic System) connection allows empty channel access, callsign-programmable squelch, digital code squelch (similar to Kenwood's DCS system), up to 14-character message transfer for display, and digital code storage.

For packet and computer enthusiasts, remote control via an RS-232 interface is made through a rear-panel mini phone jack. Although I didn't attempt to use the interface, it is possible to control the dual vfo's, memory selection and frequency/mode selection from

your PC if desired, just as on the newer HF transceivers. No doubt software will be available from ICOM to do this. For packet users, ICOM details a suggested interface to an RS-232 port using a voltage level converter, and the system used is CSMA (Carrier Sense Multiple Access) standard. RTTY fans can employ AFSK through the ACCESSORY terminal, and in both modes the DATA switch allows transceive switchover in three milliseconds. (Any outboard preamp is disabled during this operation.)

Still not satisfied? Well, if you are into slow-scan television (SSTV), operation is possible via either the front-panel microphone connector or the rear-panel ACCESSORY connector. And that OUGHT to take care of any desired operating mode, except AM. No, wait—I forgot OSCAR users! But ICOM didn't, and an interface is provided to work with the soon-to-be-released IC-475A/H for split-band transceive operation, with uplink at 435 MHz and downlink in the 145-MHz range. Of course, you can use this radio with your present 435 OSCAR uplink station, dialing both manually.

Specification	Measured	ICOM Claimed
Minimum Discernible Signal		
(USB/CW)	Less than −138 dB	N/A
(FM)	Less than −105 dB	N/A
Receiver Sensitivity*		
USB/LSB/CW for10 dB S/N	.25 uV	Less than .1 uV
FM for 10 dB S/N	.20 uV	Less than .18 uV
Squelch Law		
USB/LSB/CW	.35 uV	Less than .56 uV
FM	.15 uV	Less than .1 uV
Selectivity		
USB/LSB/CW	2.0 kHz/6 dB	2.2 kHz/6 dB
	5.0 kHz/60 dB	4.2 kHz/60 dB
FM	10.0 kHz/6 dB	15.0 kHz/6 dB
	20.0 kHz/60 dB	30.0 kHz/60 dB
Conversion Gain at first i-f stage	25 dBm	N/A
1-dB Compression at output of mixer	+7 dBm	N/A
Calculated Dynamic Range	121 dB	N/A
Transmitted Power Out @ 146.000 MHz into 50 Ohms	24 Watts	25 Watts
Low Power @ 146.000 MHz	2 Watts	2.5 Watts
Measured Transmit Frequency @ 146.000 MHz	146.0003 MHz	N/A

*Additional measurements were made of receiver sensitivity for 10 dB S/N @ 138.00 and 174.00 MHz. They are: .6 uV USB/LSB/CW and .75 uV FM @ 138.00 MHz, and .5 uV USB/LSB/CW and .55 uV FM @ 174.00 MHz.

Table 1. IC-275A performance (measured at 146.000 MHz).

Performance

As you can see, this is a radical departure from previous ICOM 2-meter transceivers. And I haven't even touched on how well it works yet, so let's now take a look at some qualitative measurements, using the Hewlett-Packard 608F rf signal generator, the Boonton 92 rf millivoltmeter, and Bird wattmeters with precision attenuators. The first thing I checked out was the performance of that GaAsFET front end and MOSFET mixer. Table 1 shows the results versus the manufacturer's claims (where applicable).

How well does the thing work? Pretty darn good, and as well as a comparable linear transverter and HF radio. The only exception is the increased sensitivity of the transverter, but other than that they compared favorably during the January VHF Sweepstakes. The human engineering is good, as those controls rarely needed are tucked out of the way. I'd prefer bigger knobs on the passband tuning and notch filter controls, as they were employed several times to flush out a weak grid square through local QRM.

Users familiar with these controls from ICOM HF transceivers will feel right at home here. The PBT functions much like an i-f shift control, varying the passband of the receive crystal filter to either side of the desired frequency, hopefully shifting QRM out of the passband. Steady carriers or QRM from CW notes can be shut out with judicious use of the notch filter. It can even help attenuate a "birdie" or spurious signals from nearby CATV systems.

In my system, I use a Microwave Modules MML 200S 200-Watt amplifier with a 12-dB-gain GaAsFET preamp after an MMT 144-28R transverter. The addition of an SPDT coax switch allowed quick and easy comparison of the transverter and 275A. The dynamic range of the MMT 144-28R is about 132 dB and its 1-dB compression point is +6 dBm, so I felt this was a fair test, especially with the GaAsFET available on weak signals. On they went, with both units running neck-and-neck on most contacts. The MMT enjoyed a definite edge on the weakest of signals, especially during "crunch time" when a strong local station was but 5 to 10 kHz away.

The ICOM did give a good accounting of itself here but just couldn't pull the signals out of the noise enough to make clear copy possible. (Now, remember we're talking about signals 1/4 to 1/2 dB out of the noise. That's not much to work with for any radio!) However, overall the receiver performance of the 275A represents a quantum leap over previous 2-meter multimodes I've used. Kicking in the outboard MML preamp made all the difference for the 275A, so I suspect that adding the accessory mast-mounted ICOM unit wouldn't be a bad idea.

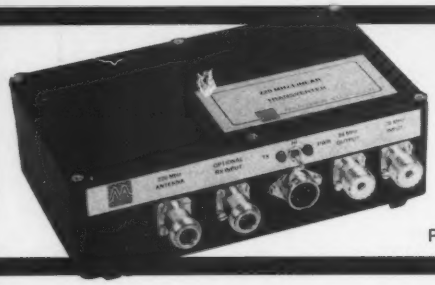
Received audio reports were excellent. One comment about the microphone audio being a bit "hot" was quickly alleviated by adjustment of the front-panel control. Audio frequency response was judged to be adequate while operating in FM mode on simplex. The 25 Watts and my 200-Watt linear made a nice "one-two punch" that had me breaking through pileups (yes, we have them on VHF, too, you HF types) to work stations in Virginia and Massachusetts on the first try. Also, I am plagued with a constant high-level "buzz" every January Sweepstakes in this neighborhood, which the switchable noise blanker took care of in a reasonably acceptable manner. I say reasonably because my IC-740 with its adjustable noise blanker was able to get rid of it completely. Are you listening, ICOM?

Note that ICOM has done away with VOX operation on the 275A, and I say good riddance to it. Most VOX circuits make keying a remote mast-mounted preamp difficult, to say the least. The DELAY control on the front panel serves only to determine the drop-out interval from TX to RX while in semi-break-in CW mode. I preferred the much faster full-break-in mode selected from the rear panel and bypassed the outboard amplifier for some truly quick CW contacts. (The keying of an outboard amplifier will remain a problem with this mode, and I'm curious to see if the 275H, with its 100-Watt final, will also incorporate full QSK.)

With all good things there's a catch, and it's a big one. This radio will set you back about $1,200, and that's without the preamp, the filter option, or any of the other goodies ICOM offers. The companion IC-275H rolls in with 100 Watts but no doubt will carry at least $150–$200 more on the price tag. That makes it the most expensive 2-meter multimode ever made and sold in this country (probably in the world, as well). However, there's no doubt you get a lot for your money, what with the filter options, PBT/notch, ac supply, memories, full-break-in CW, and more possible operating modes than you can imagine.

Conclusion

The IC-275A is an exceptionally well-designed, high-performance 144-MHz multimode transceiver, and if you are willing to spend the money for one, you won't be disappointed. This might be all the 2-meter radio you'll ever need, especially if you are into the more exotic modes such as EME, packet, AFSK RTTY, and meteor scatter. Its design lends itself well to interfacing with outboard linear amplifiers, mast-mounted preamplifiers, computers for packet work, terminal units, and even with remote-base systems. The fact that it doubles as a public-service band and MARS receiver with four scan options is just icing on the cake. Now, if ICOM would just make a 6-meter version of this transceiver.■



Microwave Modules MMT 220/28 220-MHz Linear Transverter

by Peter H. Putman KT2B

Imported by: The PX Shack
52 Stonewyck Drive
Price class: $250 Belle Mead NJ 08502

It's been a long time coming, but 220 fanatics can finally breathe a sigh of relief: Microwave Modules Ltd. of Liverpool, England, has released the first commercially built 220-MHz linear transverter to the North American market.

Those familiar with the high-quality MMT line of transverters should be pleased with the latest effort: 15 Watts output from 220 to 225 MHz, and transverter drive levels in the microwatt region. The design is based on the current MMT 144/28 and is housed in the familiar black box. Connections are simple: dc power and keying through a five-pin connector, 28-MHz transmit in, 28-MHz receive out, and 220-MHz transceive antenna jack. An additional connector is available if you want to split the 220 transmit and receive lines, as would be the case if you were using a high-power amplifier with its own antenna relay.

As with all of the "black boxes," you can tuck the MMT 220/28 out of sight once it's connected. For those of you who like to have everything in sight, the front panel includes two LEDs. One glows red when power is applied and the other glows green when in the transmit mode. An additional switch selects high or low band segment ranges.

The circuit design is simple. See Photo A for an interior view. Up to 300 mW of drive can be applied to the dual-balanced MOSFET transmit mixer, which employs a pair of 3SK51 or 3N204 devices. LO injection at two different selectable frequencies—96 MHz and 97.5 MHz—is doubled to either 192 or 195 MHz. The reason for this is to enable coverage of different band segments, as I'll show in a moment.

BFY90 and 2N5109 devices then buffer and amplify this 220-MHz signal. The driver is a 2N6080, and the final device is a CSF-Thompson SD1274 rated at better than 40 Watts dissipation, giving a good safety factor by running well under its rating.

The receiver lineup is conventional, with 3N204 devices used in the front end and receive mixer. These MOSFETs don't necessarily have the lowest noise-figure in the world, but they are rugged and their use yields a high 1-dB compression figure for the front end. Should you desire some extra gain, a low-noise GaAsFET with a pad could be employed ahead of the 3N204. It probably wouldn't be advisable to run more than 12–13 dB of gain from such a preamp into the 3N204 without significant degrading of the compression point.

Getting back to the dual LO function: One of the problems covering VHF band segments with HF transceivers is that those segments are considerably larger than the standard 28–30-MHz i-f used. This has been a problem until recently for those 2-meter users who wished to employ their HF rigs for SSB, CW, and FM work. With the advent of continuous-coverage HF rigs, it's quite simple to enable the radio to transmit from 26–30 MHz, usually by clipping a diode, removing a jumper, etc. When in the transverter mode, this will yield sufficient drive over the 4-MHz segment to allow full coverage of 2 meters.

A similar problem exists at 220 MHz because the band segment is 5 MHz wide. Microwave Modules' answer is to supply two separate LO crystals. With the standard conversion scheme, 220–222 MHz will downconvert to 28–30 MHz for the weak-signal stations. By selecting the second LO, 223–225 MHz is downconverted to 28–30 MHz, allowing simplex work and some repeater access using split vfo's.

If you have enabled your HF rig to supply you with a low-level signal (typically 10 mW or less) across this range, you're in business. Otherwise, you'll be limited to accessing repeaters with inputs above 223.00 MHz or operating simplex while on FM. The best part of it all is that you can get your feet wet on 220 using all modes without spending a lot of cash to do it, especially since no manufacturers currently make a 220-MHz multimode transceiver for the North American market.

The next step was to put the MMT 220/28 into the lab for some performance tests. First, I checked transmit linearity in both the LO and HI crystal positions, using a coaxial switch, Hewlett-Packard 608F signal generator, and Boonton 92 rf millivoltmeter. The test frequency was 220.100 MHz, and the i-f transmit and i-f receive coils were peaked at 27.000 MHz for maximum gain. All measurements were made with the input attenuator at maximum sensitivity and the fixed 1K attenuator strapped out of the circuit.

Transmit Linearity
LO Position: i-f = 28.100 MHz

Input Signal (dBm)	Output Signal (Watts)
−14	1
−12	2
−10	3
−9	4
−7	5
−6.5	6
−5.5	7
−4.5	8
−4	9
−3	10
0	13
+2 (saturated)	15

Transmit Linearity
HI Position: i-f = 25.100 MHz

Input Signal (dBm)	Output Signal (Watts)
−18	1
−16	2
−14	3
−13	4
−12	5
−11.5	6
−10.5	7
−10	8

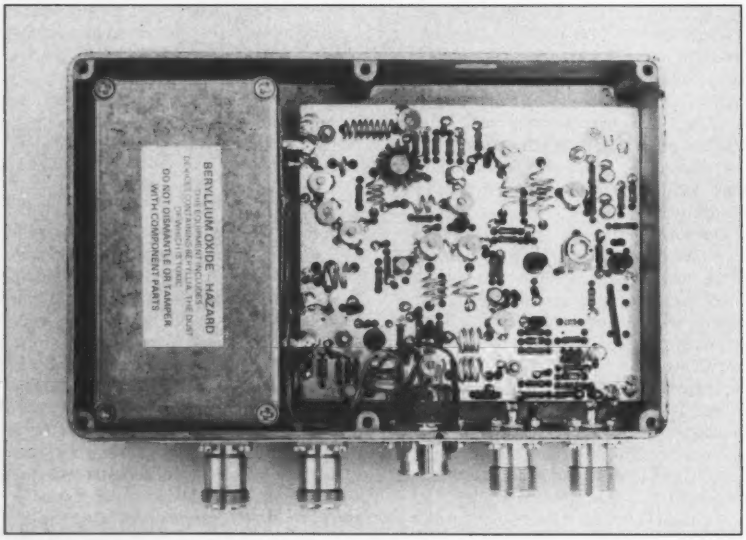


Photo A. Interior view of the MMT 220/28. The i-f board is on the right and the power amplifier compartment is on the left.

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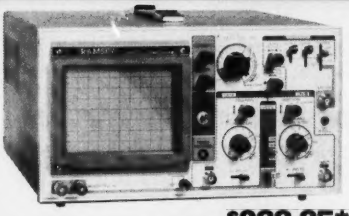

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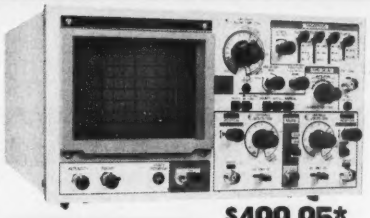
Features component testing circuit for resistors, capacitors, digital circuits and diodes—TV sync filter—high sensitivity—Z axis—XY mode—built-in calibrator—5X horizontal magnifier



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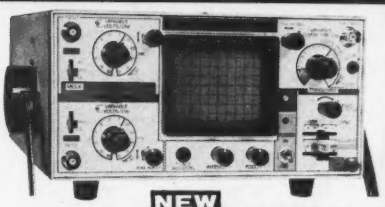
35 MHz DUAL TRACE

wide frequency bandwidth—optimal sensitivity —delayed triggering sweep—hold off—ALT trigger—single sweep TV sync 5X magnification—XY or XYZ operation— HF/LF noise reduction



NEW

INCLUDES 2 HOOK-ON PROBES **$449.95***

15 MHz DUAL TRACE PORTABLE

Field/bench applications—built-in charger and battery pack —up to 2 hours operation per charge—5X horizontal magnification—high brightness CRT—front panel trace rotator

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MODEL	BAND WIDTH	# TRACES	CRT SIZE	VERTICAL SENSITIVITY	MAXIMUM TRIG FREQ	USEABLE MAXIMUM BANDWIDTH
2200	20 MHz	(2)	8x10CM	5 mV per div	35 MHz	30 MHz
2500	15 MHz	(2)	3.5 inch	2 mV per div	30 MHz	25 MHz
3500	35 MHz	(2)	8x10CM	1 mV per div	50 MHz	60 MHz

All include high quality 1:1, 10:1 hook on probes, instruction/service manual with schematic and component layout. 1 year warranty.

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$119.95 CHARGER, NICAD BATTERIES, AC ADAPTER INCLUDED

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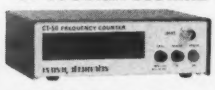
$139.95 WIRED, INCLUDES AC ADAPTER

CT-90 9 DIGIT 600 MHz

$169.95 WIRED INCLUDES AC ADAPTER

CT-50 8 DIGIT 600 MHz



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CT-125 9 DIGIT 1.2 GHz

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MODEL	FREQ RANGE	SENSITIVITY	ACCURACY	DIGITS	RESOLUTION	PRICE
MINI-100	1-500 MHz	Less than 250mv	1 PPM	7	100 Hz, 1 KHz	119.95
CT-70	20 Hz-550 MHz	< 50mv To 150 MHz	1 PPM	7	1Hz, 10Hz, 100Hz	139.95
CT-90	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	169.95
CT-50	5 Hz-600 MHz	LESS THAN 25 mv	1 PPM	8	1Hz, 10Hz	189.95
CT-125	10 Hz-1.25 GHz	< 25mv @ 50 MHz < 15mv @ 500 MHz < 100 mv @ 800 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	189.95
CT-90 WITH OV-1 OPTION	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	0.1 PPM	9	0.1Hz, 1Hz, 10Hz	229.90

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Includes Probes
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Provides distinctive audible chirp after contact has been made and meter reading has stabilized. Has TOUCH-HOLD feature to allow readings to be logged or referred to before making the next reading. Up to 10 AMP current capability and a continuity function which beeps on zero Ohms.

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PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp

$69.95 wired

PS-2 kit **$49.95**

PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies Up in frequency • great for PL tone measurements • multiples by 10 or 100 • 0.01 Hz resolution & built-in signal preamp/conditioner

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PS-10B 1 GHz PRESCALER

Extends the range of your present counter to 1 GHz • 2 stage preamp • divide by 1000 circuitry • super sensitive (50 mV typical) • BNC connectors • 1 GHz in, 1 MHz out • drives any counter

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Simple Class C power amp features 8 times power gain 1 W in for 8 out, 2 W in for 15 out, 5 W in for 40 W out. Max output of 50 W, incredible value, complete with all parts, less case and T-R relay.

PA-1, 40 W pwr amp kit **$22.95**

TR-1, RF sensed T-R relay kit **6.95**

COLOR ORGAN
See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W. runs on 110VAC.

ML-1 Kit, **$8.95**

VOICE ACTIVATED SWITCH
Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED or even a tape recorder motor. Runs on 9 VDC.

VS-1 KIT **$6.95**

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RAMSEY ELECTRONICS, INC.
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Penfield, N.Y. 14526

−9	9
−8	10
−6.5	13
−2 (saturated)	15

Obviously, the dual MOSFET mixers are sensitive. As a reference, 0 dBm is 1 milliwatt, so only 1.5 milliwatts are needed for full output at 28.100 MHz, and only .75 milliwatts of drive at 25.100 MHz. This should take care of those ICOM HF rigs with three or less milliwatts of drive, such as the IC-730 and IC-745. Transmit output was fairly consistent from 220–225 MHz (measured on a Bird 43 with 50C slug into a 25-Watt Termaline load). It varied by only 2 Watts across the full band segment in the HI position. Variation was not noticeable across 220–222 MHz while in the LO position.

Now for some receiver performance specifications. These were measured in the HI position, with the i-f receiver coil peaked at 27.000 MHz.

Receiver Performance

Specification	Measured
Minimum Discernible Signal (MDS)	Less than −127 dB
Sensitivity for 10-dB S/N ratio	.25 uV at 220.100 MHz
Conversion Gain at 27 MHz	28 dBm
1-dB Compression Point	+3 dBm

One note about conversion gain: Many users of transverters feel that unless they hear a loud "rushing" sound when their unit is connected to an HF rig (usually the result of too much conversion gain) the receiver section of the transverter isn't working correctly. Nothing could be further from the truth! I've even seen some operators kick in the 20-dB preamp on these HF rigs to bring up signal strength. Sorry, Charlie—the two are distinct functions. Ideally, conversion gain should be in the area of 25–30 dB. Much more than that and you'll have higher than "S9" noise level readings which are, of course, nonsense.

As on all MMT units, rf VOX-type keying is standard, but I prefer and highly recommend straight dc keying through pin 1 on the five-pin power connector. If you use the former, the delay is preset to about 1/2 second on dropout. The connector lineup is SO-239 at 28 MHz and type N at 220 MHz, which is a little unusual since most 220 amplifiers use SO-239s. The connector kit does come with a very nice type N connector made in France that goes together quite easily. Power requirements are about 3 Amps on transmit and less than 500 mA on receive.

One last note: Microwave Modules has discontinued using the crystal-can type T-R relay found on older MMT units, using separate connections at 28 MHz. Most of the newer HF radios with transverter functions provide those two connections. If your HF radio provides only one transceive connection at 28 MHz, you'll have to employ an SPST relay such as a DK-77 (commonly found at flea markets for about $10–$15) to make the switchover.

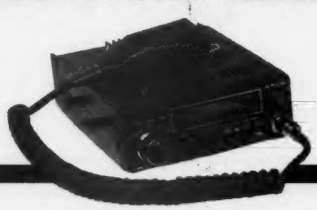
To sum up, Microwave Modules has finally filled a big gap for the VHF enthusiast by "plugging the hole" in their product line at 220 MHz with a well-designed and versatile transverter. And that's not all, folks! I've been told by the importer that plans call for a 220-MHz low-noise preamp and 220-MHz power amplifiers to be added before too long. Just throw in a 220-MHz yagi, and you'll have a hot setup for weak-signal work, packet, FM, and even moonbounce.

For more information on the MMT 220/28, circle number 202 on your Reader Service card.■

Alinco ALR-206T 144-MHz FM Mobile Transceiver

by Peter H. Putman KT2B

Alinco Electronics, Inc.
20705 S. Western Avenue, Suite 104
Torrance CA 90501
Price class: $358



Alinco Electronics of Japan burst onto the scene at Dayton last April with a dizzying array of products, including some very impressive power supplies, a 2-meter handheld radio, and the subject of this review. Curious hams bought hundreds of these products, and initial comments were extremely favorable! Not only that, but the prices were quite reasonable.

With that in mind, it should come as no surprise that I obtained an ALR-206T mobile FM transceiver for review, and can say that I am very impressed with it. This is without a doubt one of the best 2-meter FM transceivers I've ever used for a variety of reasons, primarily the super performance of the receiver section and the simplicity of operation.

Out of the Box

The ALR-206T comes in a small package. It measures only 5-1/2" wide by 2" high by 7-1/2" deep, weighing in at 2.8 pounds. Transmitter power is rated at 25 Watts high and 5 Watts low. A keyboard-type encoding microphone is used for both touchtone™ signals and frequency selection.

The control layout is strictly "no-frills," with front-panel controls selecting tuning, volume, squelch, high/low power, scan, offset, dial lamp, and standard repeater offsets. That's it!

Operation

The microphone provides control of memory selection, band scan, and tuning rate. A lock switch disables the keypad when not in use to prevent accidental tone signaling or frequency excursions while driving! One complaint right away: The cord supplied with this microphone is entirely too stiff. Several users have complained that the end of the cord pulls right out of the 8-pin plug after a few months of use. Alinco should definitely switch to a more flexible (and longer) coiled cord.

The tuning control on the front panel is sort of unique in that it behaves much like the older PTO (permeability-tuned oscillator) type controls on Astro and Cubic HF radios. It's actually a five-position switch, and you determine the automatic tuning rate by where the switch is rotated. To go up in frequency, rotate it to the right; to go down, rotate it to the left. Two positions on each side set tuning rates of 5-kHz steps at 1/2- or 1/20-second intervals.

Receiver Performance	
Sensitivity, for 10 dB quieting	.2 uV
Sensitivity, for 20 dB quieting	Less than −6 dB
Squelch Law	.35 uV
Sensitivity for S9 indication	1.5 uV
Sensitivity for full scale	2.5 uV
Selectivity (with −6 dB signal)	Better than −10 dB at ±5 kHz Better than −40 dB at ±10 kHz −60 dB at ±15 kHz
Transmitter Performance	
Power Output, High	25 Watts at 13.8 V dc from 144.0–148.0 MHz
Power Output, Low	5 Watts at 13.8 V dc from 144.0–148.0 MHz
Displayed Frequency	146.0000 MHz
Measured Frequency	146.0004 MHz

Table 1. Bench test results for the ALR-206T. Test equipment used included: a Hewlett-Packard 608F signal generator, a Boonton 92 rf millivoltmeter, and a Bird 43 wattmeter with 50C and 10C slugs. All measurements were made at 146.000 MHz unless otherwise noted.

Of course, to go anywhere in a hurry, just enter the last four digits of the desired frequency via the keypad (e.g., 146.985 MHz enters as 6985). Selection is complete once the final digit is entered. You can also clear the display and the frequency in use by depressing the clear button, which is colored yellow. Up to ten of your favorite 2-meter frequencies can be stored in memory. In addition, you can program memory #10 as a nonstandard offset. Standard offsets are −600 and +600 kHz, selectable from the front panel.

The display is a green LCD type, and a lamp switch provides additional illumination. The display shows the frequency in use, the offset selected, the memory channel selected, and has a signal strength/power meter. I found the lamp necessary most of the time to make the display readable, and suspect that lamp burnout will be a headache for the U.S. distributors as a result. The signal strength meter is of the ascending-mark type, with solid marks up to S9 and two outlines above that level. The three LEDs to the left of the display show TX/BUSY, LOW (when low power is selected), and DUP (when either offset is selected).

Alinco gets high marks for the well-designed simple panel layout. Each control is easy to find and each control's function is very obvious. Most importantly, the three most important controls—tuning, volume, and squelch—are in the clear and the knobs are just the right size. Human engineering is so often overlooked in the smaller FM 2-meter transceivers, but not here.

The keypad microphone is equally easy to use. Tone reinforcement lets you know if you've hit the keys correctly. When entering memories into the radio, the last step correctly executed results in a low-frequency tone. Entering those memories is very easy! Just dial up the frequency desired, depress the "F" and "MR" keys, then the number of the memory channel you want it stored in.

One feature I never use but some other owners have complained to me about is the program scan mode, where you define the upper and lower limits of a scan area (say, 145.500 to 146.500 MHz). It takes a bit of programming to set it up, and if you transmit or turn the power off, the program is lost. Personally, I don't consider this a drawback, but if you like to scan band segments it could be a hassle.

Audio output from the internal speaker is about 2 Watts, more than enough for mobile operation. I strongly suggest an external speaker, as I do with most mobile radios, since most of your audio is directed into either the floor or upholstery from the internal speaker. Some users have complained of distorted audio on cold days, but I have yet to notice this effect after several chilly mornings (below 20 degrees). Transmitted audio had a slight tinny quality, bringing reports that "It doesn't sound like you!" from stations used to my old Kenwood TR-7400A. This could easily be corrected by reshaping the response of the electret condenser microphone, which has plenty of high-frequency response.

Mobile operation in general is a breeze, with the exception of that stiff and short microphone cord. I mounted the unit below my ICOM IC-37A, creating a very compact two-band station. The Alinco-supplied mounting bracket comes with four plastic spacers that attach to the radio. They slide along a cutout into the bracket, with the rearward spacers locking into a rear section of the slot. Three adjustable positions are available. It makes for an unusual bracket, but it is strong. Rear-panel connections are for dc power, antenna, and external speaker. The heat sink seems a little light for 25 Watts, but it never got appreciably warm in daily use.

Performance

As I mentioned earlier, the ALR-206T has about the best receiver I've seen yet in a 2-meter transceiver. One big reason is the filter lineup, with four poles at 10.7 MHz and two poles at 455 kHz. Alinco claims selectivity figures of less than ±15 kHz at −60 dB, which would be a radical departure from most of the Japanese 2-meter transceivers I've used or seen. But lo and behold, it really is that selective!

Where I live in northern New Jersey, there are considerable problems with 15-kHz channel spacing. One case in particular involves a local repeater that I use on occasion. Its users experience splash-over and adjacent-channel interference from a strong repeater in New York City just 15 kHz higher. Despite all of the arguments about whose fault this problem is, or whose transmitter is or isn't clean, the fact is that the situation hasn't been resolved. With the ALR-206T available, it might not need to be! This is the first FM transceiver I've used that thumbs its nose at the problem.

Previously, while driving within line-of-sight of the Manhattan skyline, this adjacent-channel problem was so severe it made communications on the local repeater impossible, especially with a ridge of hills between my car and that repeater. With the Alinco the problem is virtually nonexistent, even when I drive within five miles of the New York City repeater. It's difficult to even hear them 10 kHz off frequency. It goes without saying that I was eager to run the ALR-206T on the test bench to find out how good that receiver is!

Take a look at the results of the bench testing shown in Table 1. Impressed? You should be. This is a lot of radio for a little money that is exceptionally engineered. No useless bells and whistles—just those features needed for everyday operation. It's rugged, small, and attractive. Other than the complaints regarding the microphone cord, program scan, and panel light, I have nothing but nice things to say about the Alinco ALR-206T, especially that sharp receiver! For more information about the Alinco ALR-206T, please check Reader Service number 201.■

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40 Meters In A Nutshell

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Number 1 on your Feedback card

One of my greatest satisfactions is when I make a QSO using a homemade project. The particular one shown here (Photo A) started as a simple vfo to be used with my present SSB transceiver. It worked so well that I decided to build a small portable receiver that I could take on trips or use as an emergency set. The performance of the receiver was amazing, especially considering its simplicity, so I went whole hog and built the transceiver, which I will describe here.

The transceiver is built using three modules: the vfo (or bfo when on receive), the receiver, and the transmitter (see Fig. 1). All

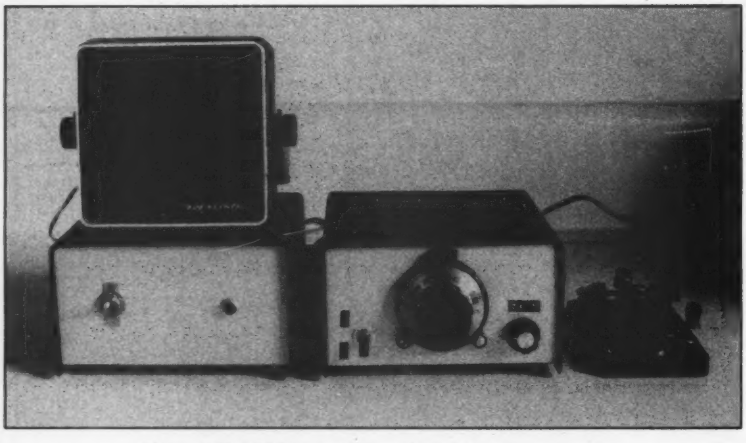

Photo A. The QRP transceiver and matching power supply.

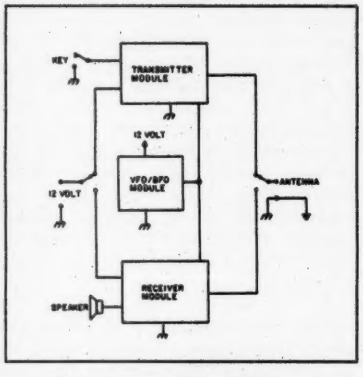

Fig. 1. Transceiver block diagram.

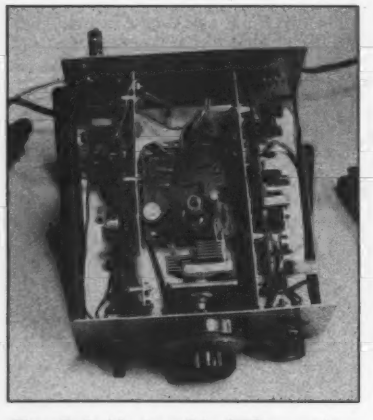

Photo B. Inside view of the QRP transceiver.

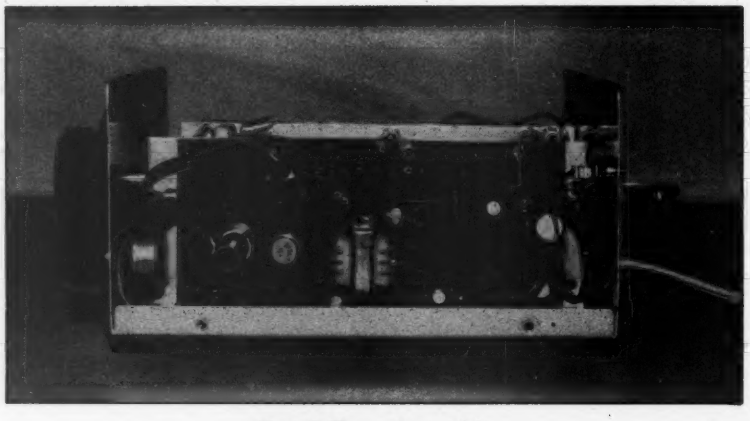

Photo C. The receiver module.

components used are widely available, and all circuits are proven designs found in various handbooks and other literature. It should not be too difficult to depart from my setup if you consult the appropriate references.

The Vfo

The vfo consists of a FET Hartley oscillator (Q1) and a two-transistor buffer with shunt feedback (Q2, Q3) to provide adequate isolation. An rms output of about .1 volts is obtained to drive the transmitter module or to be used as a local oscillator (bfo) for the direct conversion receiver front end. With the values shown, the coverage will be just about 100 kHz and almost perfectly linear; thus a direct readout is obtained with a dial setting of 0–100.

A 100-kHz bandspread was chosen because most CW operation is confined to small segments of the 40-meter band. With the dial mechanism shown, each knob rotation will correspond to 25 kHz, which is adequate for this type of operation. Incidentally, the receiver will copy SSB amazingly well. The transceiver requires a well-filtered and regulated power supply, and a secondary regulation is provided for the oscillator by the zener diode, D2 (see Fig. 2).

As I said before, the project evolved from a simple vfo. So when the transceiver was finally assembled, an oscillator offset was needed to provide the correct transmit/receive relationship. Otherwise, it would be necessary to retune between transmit and receive when in QSO with other transceivers, especially those without an RIT. The circuit is very simple and is shown below the vfo/bfo schematic (Fig. 4). It is mounted on a small solder terminal strip next to the 100-pF variable capacitor.

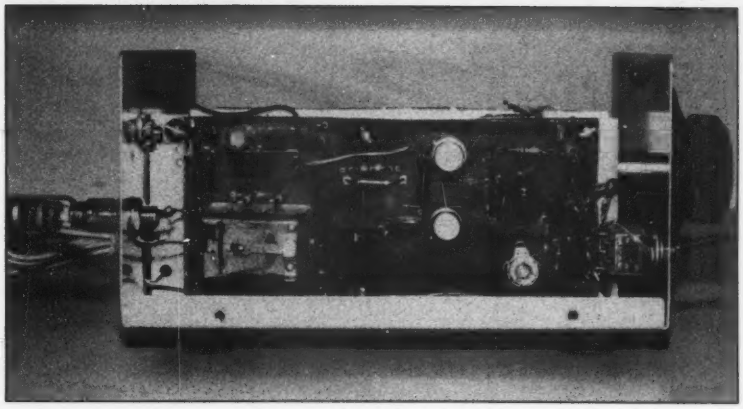

Photo D. The transceiver module.

The Receiver

The receiver is a direct conversion design and it is simplicity itself. It uses a CA-3028 chip as a balanced product detector in the front end, a 2N3904 transistor as an audio preamplifier, and an LM-386 0.4-Watt-output amplifier to drive a speaker or headphones. I used a small slug-tuned coil in the front end, but there is no reason why a small powdered-iron toroid cannot be used instead with an adequate trimmer capacitor (see the receiver module parts list and Fig. 5).

The product detector, IC1, is coupled to the 2N3904 by means of T1, which is used in auto-transformer fashion. I did this in order to lower the output impedance of the product detector, thus improving cross-modulation and blocking characteristics. However, I found later that a simple attenuator was still necessary in some cases, so I added R13 and SW1. With SW1 closed, cross-modulation is greatly reduced, while sensitivity is still adequate.

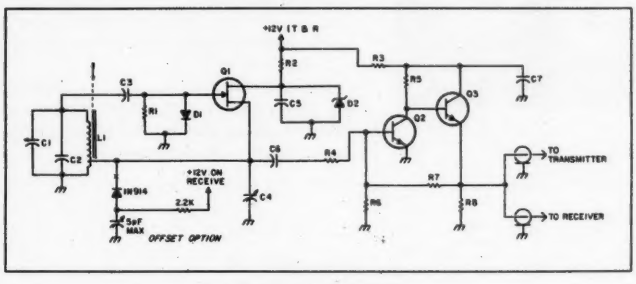

Fig. 2. Vfo schematic.

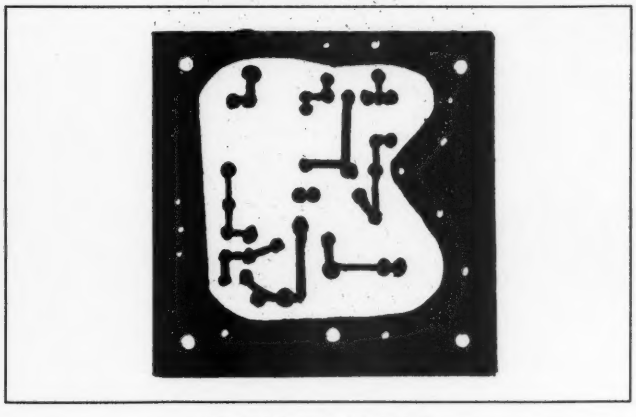

Fig. 3. Vfo module, foil side.

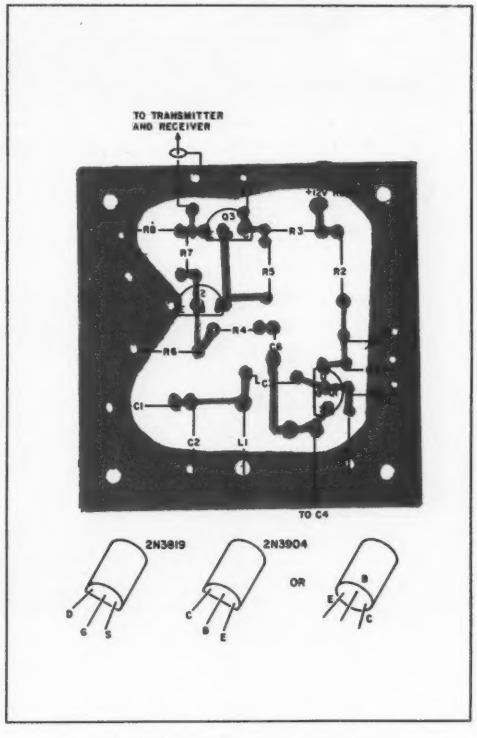

Fig. 4. Vfo module, component side.

In order to shape the audio response to favor the reception of CW signals, I included various capacitors in the circuit. C4 and C6 help to center the audio bandpass around 1 kHz. C6 is connected to the 8-Ohm winding, but there are no further connections to the winding. I did not want to include too many bells and whistles in this project in the interest of cost and simplicity. Nevertheless, the receiver will detect a 0.1-uV signal, but its main limitation is due to its being able to receive both sidebands simultaneously.

The Transmitter

You could argue about the futility of using a 1-Watt transmitter with a receiver capable of receiving very weak signals, but when I considered that a 1-Watt signal is only about three S-units below a 100-Watt one, things didn't seem so bad. Of course, there are advantages in running low power: low cost, portability, and compactness. After all, it's the antenna that does most of the job!

The transmitter consists of two stages—a 2N2222 driver stage and a 2N3866 (or similar) class C power amplifier. Using a small toroid, the driver is coupled through a tuned circuit to the base of the amplifier. The output circuit is a one-section half-wave network. The impedances involved are 50 Ohms to 50 Ohms, so no transformation takes place. The transmitter module also incorporates the antenna changeover relay, the keying circuit, and the sidetone generator. The power output is more than 1 Watt, and the second harmonic rejection is better than 20 dB down.

The sidetone level is controlled by a small PC-type trimmer pot. I drilled a small hole at the back of the cabinet to permit adjusting it from the outside. The relay shown operates with 6 to 8 volts at about 12 mA, so a series resistor is used to drop the voltage. The various leads from RY1 are soldered directly to the appropriate points on the foil side.

The transmit or receive mode is controlled by S1 as shown in Fig. 8. This DPDT switch selects the 12 volts to the corresponding module, while grounding the unused one. The vfo/bfo is, naturally, always on. The transceiver is turned on or off at the power supply.

The current requirements are less than 100 mA during receive and around 300 mA on transmit, key down. When the rig is connected to a 50-Ohm resistive load, full output is obtained, but antenna systems with more than 1.5:1 swr may reduce the output and cause instability or even damage the output transistor. I use a transmatch with my trapped vertical with excellent results.

The keying is clean and I have not detected any spurious responses or emissions. I would like to emphasize the need for a good ground connection to avoid hum problems.

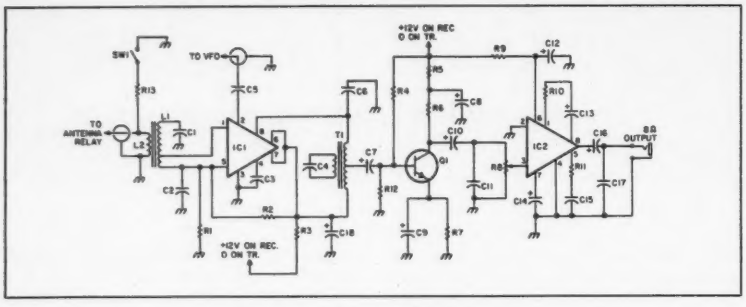

Fig. 5. Receiver module schematic.

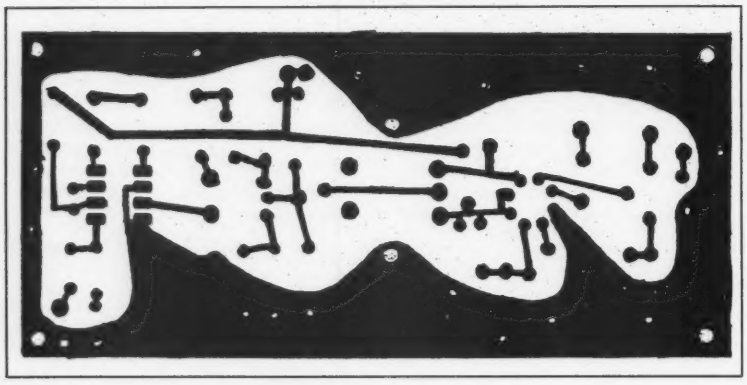

Fig. 6. Receiver module, foil side.

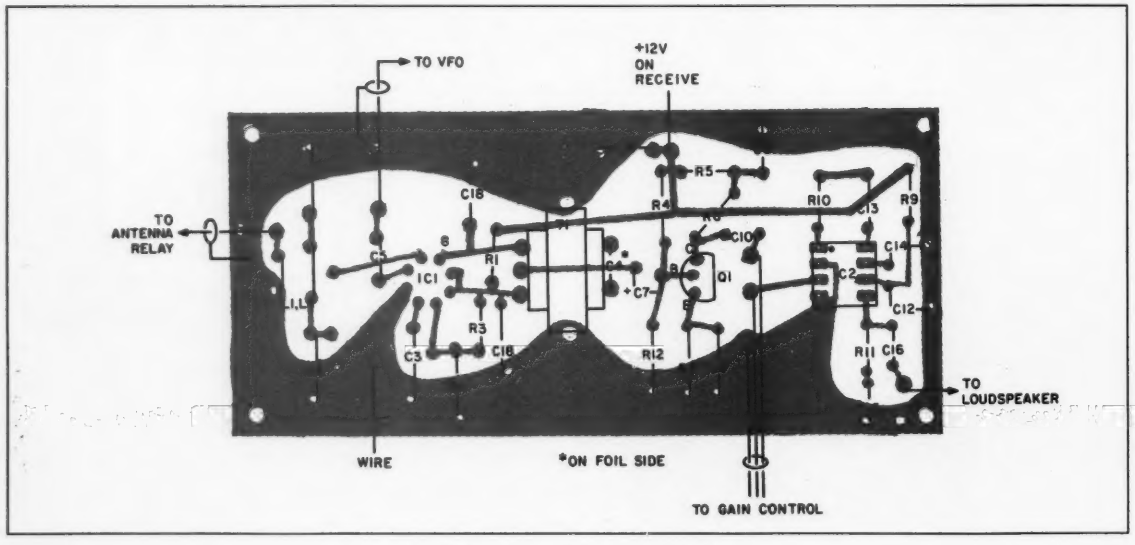

Fig. 7. Receiver module, component side.

HF Equipment	Regular	SALE
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AT-150 Automatic antenna tuner	445.00	349.95
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	
IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	899.95
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EX-242 FM unit	44.00	
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FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-44A SSB filter (2nd IF)	178.00	159.95

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FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
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MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
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CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	149.95
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	124.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	559.00	489.95
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AG-20* Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	969.95
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PS-35 Internal power supply for (H)	199.00	179.95
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EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	
VHF/UHF mobile multi-modes	Regular	SALE
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IC-27H Compact 45W 2m FM w/TTP mic	459.00	399.95
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IC-47A Compact 25W 440 FM, TTP mic	549.00	479.95
PS-45 Compact 8A power supply	139.00	129.95
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IC-28A 25W 2m FM, UP/DN mic	429.00	369.95
IC-28H 45W 2m FM, UP/DN mic	459.00	399.95
IC-38A 25W 220 FM	459.00	399.95
IC-48A 25W 440-450 FM	459.00	399.95
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Construction

I built the vfo first, using glass-epoxy PC board. The coil is very important; after you wind it, give it a coat of clear plastic (I used Krylon™ spray). Once the components are assembled on the board, you can cement the coil form to the board with epoxy. Some ceramic forms may have a mounting screw or studs that can be soldered directly to the board for support. Photo B shows the position of the vfo board, the capacitor, and the dial.

I mounted the tuning capacitor on a bracket cut from 1/8-inch aluminum angle, but 1/16-inch stock will also do the job. First I drilled the hole for the shaft of the dial, then I positioned the bracket behind the hole and marked it. This ensured good alignment. All the mounting holes for the bracket and the dial were made slightly larger to allow some play. After the vfo components are mounted, you should try it for stability and for a preliminary calibration by listening to it on a suitable receiver. Also, you can check the output with an rf probe; it should be around 0.1 volts rms.

I mounted the receiver and transmitter modules vertically on each side of the vfo using two pieces of L-shaped aluminum made from the rear cover of a 5-1/4" by 3" by 2-1/8" chassis box. The modules are held to these plates by 1/4-inch spacers, and the plates themselves are held to the bottom of the cabinet by the screws that hold the rubber feet. The plates act as shields or baffles and help to make the cabinet sturdier. Of course, there are alternatives to this system, such as using separate cabinets. This is one of the advantages of building in modular form. I prefer to have everything in one cabinet, except the power supply, which I usually build in an identical unit.

The power supply should be very well-filtered and regulated to avoid stability and hum problems (see Fig. 11). A 12-volt battery will also make a suitable supply.

As you can see from Photo B, the gain control is to the right of the tuning knob and the mode switch is to the left. Later on, I added the attenuator switch, SW1 of the receiver module, above the gain control. At the rear, just below the hole for the sidetone, I installed the antenna connector, and I installed the speaker jack at the other side.

Tests and Operation

Once you get everything assembled and connected, calibrate the vfo so it covers the

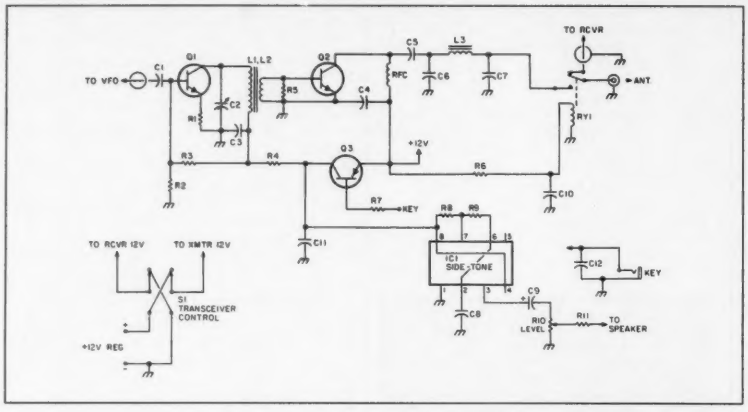


Fig. 8. Transmitter module schematic.

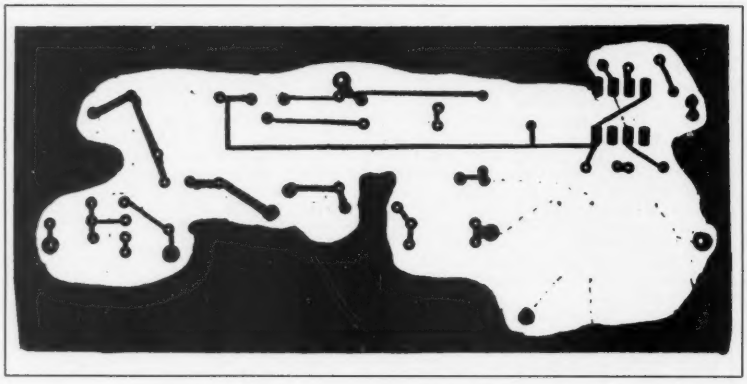


Fig. 9. Transmitter module, foil side.

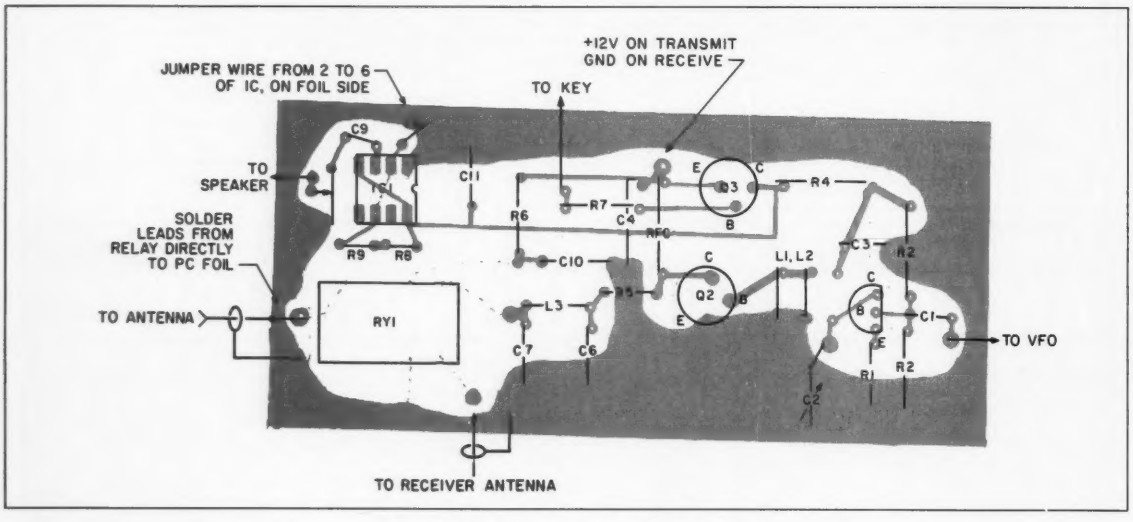


Fig. 10. Transmitter module, component side.

desired 100-kHz segment. With the vfo capacitor fully meshed, adjust the coil slug to obtain the low frequency limit, then set the capacitor at minimum capacity (dial at 100) and adjust the trimmer (C1). This procedure may have to be repeated a couple of times.

Your dial reading should track quite close to the frequency. I set mine to track from 7.0 to 7.1 MHz, and it holds true within a couple of kHz. If you want to set it for the Novice band, set the low end at 7.1 MHz and the high end at 7.2 MHz.

Next you should adjust the front end of the receiver. Set the dial to its midpoint and adjust the slug of the receiver for maximum signal from a generator or station. Of course, if you use a toroid front end, adjust the corresponding trimmer. No further adjustments are required for the receiver, unless you change segments later on.

To adjust the transmitter, first connect the set to a dummy load. A 47-Ohm, 2-Watt resistor will make a suitable one. A sensitive voltmeter with an rf probe is very useful during this adjustment. Turn the mode switch to transmit and close the key. Adjust C2 to resonance while measuring the rf voltage at the base of the output transistor; it should peak at around 1 or 1.5 volts. This adjustment will hold for the whole segment if it's done at the midpoint as the receiver was. Now you can check the voltage (rf rms) across the

Vfo Module Parts List

C1	10-pF miniature ceramic or air trimmer
C2	150-pF polystyrene or dipped mica
C3	20-pF polystyrene or dipped mica
C4	100-pF variable capacitor, semi-circular plates
C5	.1-uF, 50-volt ceramic
C6	.01-uF, 50-volt ceramic
C7	.1-uF, 50-volt ceramic
D1	1N914 diode
D2	6.2-volt, 1-W zener
R1	100k Ohms, 1/2 W
R2	220 Ohms, 1/2 W
R3	100 Ohms, 1/2 W
R4, R7	10k Ohms, 1/2 W
R5	1k Ohms, 1/2 W
R6	2.2k Ohms, 1/2 W
R8	330 Ohms, 1/2 W
Q1	2N3819 FET (MPF 102 can be used, modifying PC board for proper pin connections.)
Q2, Q3	2N3904 or 2N2222
L1	19 turns #26 enamel wire, close wound on a 1/4-inch slug-tuned plastic or ceramic form. Tap at 5-1/2 turns from ground. See vfo schematic for offset circuit values.

Transmitter Module Parts List

C1, C8, C10, C11	.01-uF, 50-volt disc ceramic
C2	150-pF ceramic trimmer, RS 272-1339
C3, C4, C12	.1-uF, 50-volt disc ceramic
C5	.05-uF, 50-volt disc ceramic
C6, C7	470-pF, 50-volt disc ceramic
C9	4.7-uF, 16-volt electrolytic
R1	47 Ohms, 1/2 W
R2	220 Ohms, 1/2 W
R3, R7	2.2k Ohms, 1/2 W
R4	100 Ohms, 1/2 W
R5	39 Ohms, 1/2 W
R6	470 Ohms, 1/2 W
R8	10k Ohms, 1/2 W
R9	100k Ohms, 1/2 W
R10	500-Ohm PC trimmer pot, RS 271-226
R11	100 Ohms, 1/2 Watt, not on circuit boards (Connect between sidetone and speaker to avoid shorting receiver audio.)
IC1	NE 555 timer chip
RY1	SPDT 6–8-volt miniature relay, RS 275-004 or similar
L1	30 turns #30 wire on a T-37-2 toroid
L2	4 turns #26 wire over ground end of L1
Q1	2N2222 or similar NPN transistor
Q2	2N3866 or equivalent 5-Watt HF transistor
Q3	2N3906 or similar PNP switching transistor
L3	16 turns #22 wire on a T-37-2 toroid

All inductors use enamel wire.

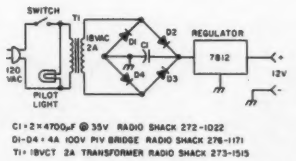


Fig. 11. Ac power supply schematic.

Receiver Module Parts List

C1	160-pF mica or polystyrene (or 150-pF trimmer, RS 272-1339 if using toroid inductor)
C2	.05 ceramic, 50 volts
C3, C5, C11	.01 ceramic, 50 volts
C4	4.7-uF, 16-volt tantalum, connect on foil side
C6, C15	.05 ceramic, 50 volts
C7	10-uF, 16-volt electrolytic or tantalum
C8, C14	22-uF, 16-volt electrolytic
C9	10-uF, 16-volt electrolytic
C10	4.7-uF, 16-volt tantalum
C12	100-uF, 35-volt electrolytic
C13	10-uF, 16-volt electrolytic
C14	22-uF, 16-volt electrolytic
C16	220-uF, 16-volt electrolytic
C17	.1 ceramic, 50 volts
C18	22-uF, 16-volt electrolytic
R1, R2	4.7k Ohms, 1/2 W
R3, R9	100 Ohms, 1/2 W
R4	100k Ohms, 1/2 W
R5	220 Ohms, 1/2 W
R6	1k Ohms, 1/2 W
R7	470 Ohms, 1/2 W
R8	10k Ohms, 1/2 W
R10	1.5k Ohms, 1/2 W
R11	10 Ohms, 1/2 W
R12	10k Ohms, 1/2 W
R13	22 Ohms, 1/2 W (If blocking and cross-modulation problems persist, try 10 Ohms.)
T1	Miniature audio transformer, 1k-Ohm primary CT, 8-Ohm sec., RS 273-1380
IC1	RCA CA-3028 differential amplifier IC
IC2	LM-386 400-mW amplifier IC
Q1	2N3904 or 2N2222 transistor
L1	18 turns close-wound #26 wire on 1/4-inch slug-tuned plastic or ceramic form, tap at 9 turns from low end
L2	2 turns #26 over low end of L1
L1	Alternate, 28 turns of #30 on T-37-2 toroid with tap at 13 turns from low end
L2	3 turns #26 over low end of L1

dummy load; it should be around 7 to 7.5 volts, indicating that you are getting a hefty 1-Watt output or slightly more.

There is one final adjustment that you should do—the vfo offset. I found that the easiest way to do this is to listen to the vfo signal on a separate receiver, then adjust the 5-pF trimmer so that on receive the frequency will be about 1 kHz lower than on transmit.

Operating Notes

When operating this little rig, you should consider a few things. Since the receiver will receive on either side of zero beat, it is necessary to listen on the high side (upper sideband). The transmit frequency will adjust automatically to that side because of the offset adjustment mentioned before.

Also, remember that you are operating with only 1 Watt, so try to work stations with loud signals. Weak ones may not hear you through the noise and QRM.

It is important to have a good resonant antenna system to obtain good results. I have worked many stations with my ground-mounted vertical and a transmatch adjusted to 1:1 swr. With ungrounded systems, hum may develop in the receiver, so a good separate ground is indispensible. With my antenna system, I have found that an additional ground connection is not necessary.

There is no reason why this transceiver could not be used on other frequencies by using the appropriate tuned circuits, but I have not tried this yet. I am working on a higher power transmitter idea. If you do the same thing before I do, won't you let me know about it? ■

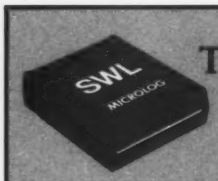
References

Solid State Design for the Radio Amateur, ARRL.

"A 20-Meter High-Performance Receiver," Rusgrove, *QST*, April, 1978.

The ARRL Handbook for the Radio Amateur, 1986.

"A 75-meter monoband transceiver," Littlefield, *Ham Radio*, November, 1985.



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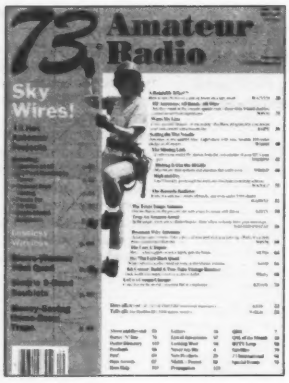

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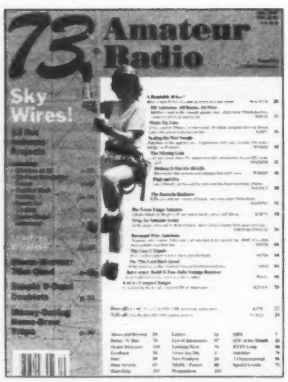

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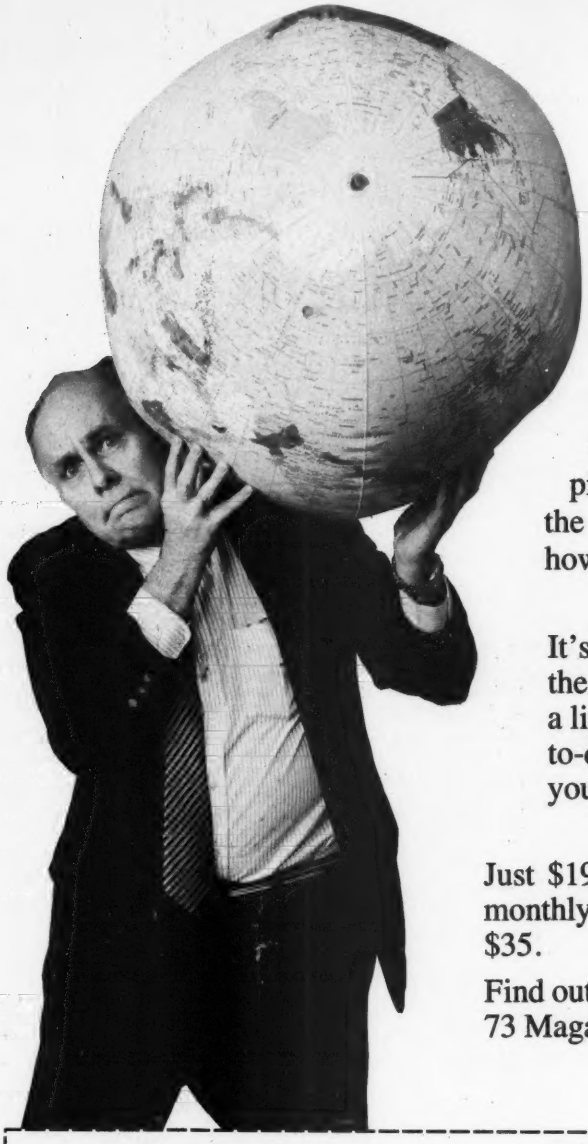

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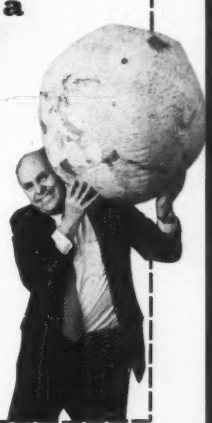

Mark Henkel WB9LYH
1624 Burgandy Lane
Stevens Point WI 54481

C-64 Slow Scan

A picture is worth a thousand words.

Number 2 on your Feedback card

Have you had to turn the page on articles about receiving SSTV and FAX because they were written for a TRS-80 and you have a Commodore 64? If so, this project is for you.

After reading such a set of articles by K6AEP (*73*, November and December, 1984), I corresponded with the author, only to discover that no information was available on how to use his interface with the C-64. The solution? I decided to create my own. First I obtained a board from L. W. Interface (9570 Kingsman Road, Novelty OH 44072). Then I wrote several assembly-language routines and prepared a hardware interface for the C-64. When possible, I used proven, available hardware designs, such as the KA4IWG SSTV interface.

Hardware

Fig. 1 details the interface circuitry. The C-64 expansion port is not buffered. However, the need for a three-state data bus and the use of a card cage remote from the C-64 indicate the need for external buffering. Consequently, I prepared a buffer card that plugs into the expansion port and connects to the card cage with 18" of multi-conductor ribbon. Components are surface-mounted in each side of the double-sided board and lines D0–D7 are run through a 74LS245, a bi-directional three-state buffer.

Another data buffer is already on the video display board, and a third is used to buffer the output of the ADC. Address lines A0–A2 are buffered by a 74LS541 set up to write only. External devices do not address the C-64. The fourth address line, buffered by a section of 74LS08, comes from pins 7 and 10 of the C-64. These lines go low when the respective expansion port section, I/O1 or I/O2, is accessed. I/O1 begins at address 56832, and I/O2 begins at 57088.

The enable signal called for by the K6AEP board is the phase 2 clock signal from the C-64. The R/W signal is self-explanatory. Both signals are buffered by 74LS08 sections. Construct a +5-volt 3-Amp supply to power the video display and other boards. Do not attempt to power the K6AEP board from the C-64 power

Address	Function
57000	6845 pointer register
57001	6845 control registers (R0–R13)
57003	Read data from ADC
57004	Reset video display card by addressing port
57005	Load data to video display card
56577	User port (sync detection)
56579	User port data direction register (load "0" for receive)

Table 1. C-64 port addresses used to send and receive.

Key	Function
S	8.5-second format
M	12-second format
L	16-second format
E	36-second format
D	Double top half of picture to fill entire screen
1	Expand upper left quadrant
2	Expand upper right quadrant
3	Expand lower left quadrant
4	Expand lower right quadrant
5	Expand control area
F1	Receive (press after selecting time of transmission)
F3	Place C-64 memory contents on screen
F5	Clear C-64 and screen
INST/DEL	Abort (press during transmission)

Table 2. Special function keys.

Pin	Connection
A	Ground
E	02 clock (enable)
W	A2
X	A1
Y	A0
Z	Ground
1	Ground
2, 3	+5 from C-64
5	R/$\overline{W}$
7	I/O1
10	I/O2
14	D7
15	D6
16	D5
17	D4
18	D3
19	D2
20	D1
21	D0
22	Ground

Table 3. Commodore 64 expansion port pin locations.

Pin	Connection
1	Ground
2	+5
10	9 V ac
11	9 V ac
12	Ground
A	Ground
C	PB0
N	Ground

Table 4. Pin connections from the C-64 user port.

supply, which has a limited capacity.

Two additional hardware changes were made. The C-64 analog/digital converter operates so slowly that an external chip was added to speed up the process. The ADC0804 is part of the KA4IWG SSTV interface and works fine in free-running mode. It is allowed to access the three-state data bus by bringing pin 12 low on U14, a 74LS138 on the K6AEP board. That pin is wired to the data buffer on the ADC board.

A connector was obtained for the C-64 user

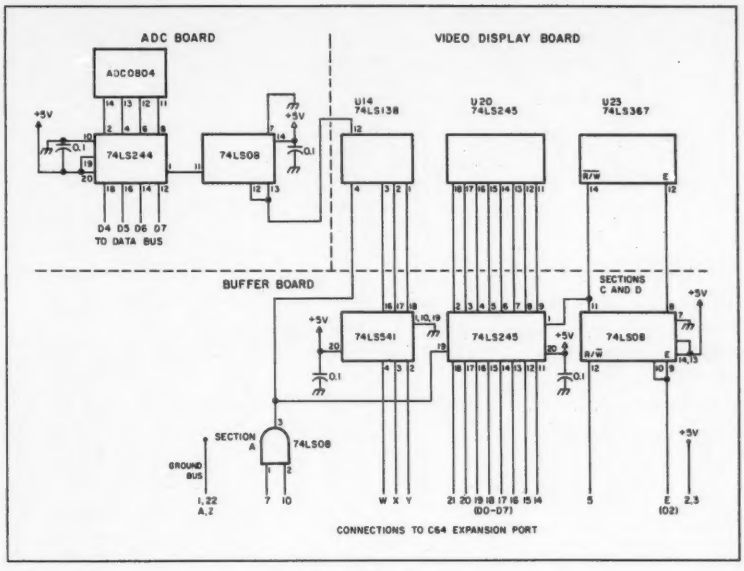

Fig. 1. Interface circuitry.

```
2 *= $C000
3 ; "INITIALIZE"
4 .NH
5  S
9 .O
9 .D SLOSCAN
10 PORTA = 57000
11 PORTB = 57001
12 PORTC = 57003
16 PORTD = 57004
18 PORTE = 57005
20 PORTF = 56577
22 PORTG = 56579
23 MEMC = 823
24 MEMD = 824
25 LDA #0
26 STA 53265
60 LDA #00
61 STA PORTA
62 LDA #191
63 STA PORTB
64 LDA #$01
65 STA PORTA
66 LDA #128
67 STA PORTB
68 LDA #2
69 STA PORTA
70 LDA #$92
71 STA PORTB
72 LDA #3
73 STA PORTA
74 LDA #1E
75 STA PORTB
76 LDA #4
77 STA PORTA
78 LDA $78
79 STA PORTB
80 LDA #5
81 STA PORTA
82 LDA #35
83 STA PORTB
84 LDA #6
85 STA PORTA
86 LDA #119
87 STA PORTB
88 LDA #7
89 STA PORTA
90 LDA #$01
91 STA PORTB
92 LDA #8
93 STA PORTA
94 LDA #1
95 STA PORTB
96 LDA #9
97 STA PORTA
98 LDA #1
99 STA PORTB
100 LDA #10
101 STA PORTA
102 LDA #0
103 STA PORTB
104 LDA #11
105 STA PORTA
106 LDA #0
107 STA PORTB
108 LDA #12
109 STA PORTA
110 LDA #0
111 STA PORTB
112 LDA #13
113 STA PORTA
114 LDA #0
115 STA PORTB
116 LDA #14
117 STA PORTA
118 LDA #0
119 STA PORTB
120 LDA #15
121 STA PORTA
122 LDA #0
123 STA PORTB
124 LDA #16
125 STA PORTA
126 LDA #0
127 STA PORTB
128 STA PORTG
137 JMP WAIT
138 .FILE RECEIVE
```

Program listing 1. The initialize routine initializes the 6845 chip, then jumps to the control routine and waits in a loop.

```
8 ; "CONTROL"
10 WAIT LDA #$20
11 STA 252
12 LDA #0
13 STA 251
14 STA PORTD
15 LDA #128
16 STA 253
17 LDA #240
18 STA 254
20 WATE LDA 197
21 CMP #13
22 BNE NXA
23 JMP SHORT
24 NXA CMP #36
25 BNE NXB
26 JMP MEDIUM
27 NXB CMP #42
28 BNE NXC
29 JMP LONG
32 NXC CMP #14
33 BNE NXD
34 JMP EXTL
35 NXD CMP #4
36 BNE NXE
37 JMP VSYNC
38 NXE CMP #5
39 BNE NXF
40 JMP MOVE
41 NXF CMP #6
44 BNE NXG
45 JMP CLEAR
46 NXG CMP #18
47 BNE NXJ
49 JMP HRT
52 NXJ CMP #56
53 BNE NXZ
54 JMP MAP
55 NXZ CMP #59
56 BNE NXY
57 JMP MBP
58 NXY CMP #8
59 BNE NXW
60 JMP MCP
61 NXW CMP #11
62 BNE NXV
63 JMP MDP
64 NXV CMP #16
65 BNE WJC
66 JMP MEP
167 WJC JMP WATE
173 SHORT LDA #43
174 STA MEMC
175 LDA #37
176 STA MEMD
177 JMP WATE
178 MEDIUM LDA #50
179 STA MEMC
180 LDA #44
181 STA MEMD
182 JMP WATE
200 LONG LDA #56
201 STA MEMC
202 LDA #50
203 STA MEMD
204 JMP WATE
205 EXTL LDA #70
206 STA MEMC
207 LDA #64
208 STA MEMD
209 JMP WATE
213 MAP LDA #0
214 STA 251
215 LDA #$20
216 STA 252
217 JMP VRT
220 MBP LDA #$20
221 STA 252
222 LDA #$40
223 STA 251
224 JMP VRT
230 MCP LDA #0
231 STA 251
232 LDA #$60
233 STA 252
234 JMP VRT
240 MDP LDA #$60
241 STA 252
242 LDA #$40
243 STA 251
244 JMP VRT
250 MEP LDA #$40
251 STA 252
252 LDA #$20
253 STA 251
254 JMP VRT
255 .FILE HORIZS
```

Program listing 2. The control routine is a wait loop. It initializes the counters, then waits until an option is selected and jumps to that option.

```
1 ; "RECEIVE"
2 RCVC LDX MEMD
3 NOP
4 RCVA LDX MEMD
5 OWT DEX
6 BNE OWT
14 RCVB LDA PORTC
16 LSR
17 LSR
18 LSR
19 LSR
20 STA 2
32 LDX MEMC
33 ONE DEX
34 BNE ONE
35 LDA PORTC
36 AND #240
37 ORA 2
38 STA (251),Y
39 STA PORTE
40 DEC 253
41 BNE ALF
42 JMP HSYNC
43 ALF INC 251
44 BNE RCVC
46 INC 252
47 JMP RCVA
48 .FILE CENTRAL
```

Program listing 3. The receive routine gets four bits at a time from the ADC and loads a byte both into the C-64's memory and onto the video board.

```
10 ; "HORIZS"
12 MOVE LDX #$A0
14 STA PORTD
20 TREE LDA (251),Y
22 STA PORTE
23 INC 251
24 BNE TREE
25 INC 252
26 CPX 252
27 BNE TREE
28 MUP LDA 197
29 CMP #64
30 BNE MUP
31 JMP WAIT
32 CLEAR LDX #$A0
33 LDA #$18
34 STA 252
35 LDA #0
36 STA 251
37 TAY
38 STA PORTD
39 LDA #255
40 MORE STA (251),Y
41 STA PORTE
42 INC 251
43 BNE MORE
44 INC 252
45 CPX 252
46 BNE MORE
47 JMP WAIT
55 HSYNC LDA PORTF
56 AND #1
57 BNE THREE
60 CPY 197
61 BNE HSYNC
62 JMP WAIT
63 THREE LDA PORTF
64 AND #1
65 BNE THREE
66 LDA #128
67 STA 253
68 DEC 254
69 BEQ OUT
70 JMP ALF
71 OUT JMP WAIT
72 .FILE VERTS
```

Program listing 4. This routine detects the horizontal sync (H sync), and also reloads the C-64's memory to the display board (move) and clears the screen and memory (clear).

port to permit interface to the SSTV converter. The "horizontal" line from the converter board carries both vertical and horizontal sync to PB0 of the user port where it is detected by software.

The K6AEP board itself required only that a wire be run from pin 12 of U14 to one of the unused contacts on the board. This permits U14 to select the ADC. Also, a 7400 was substituted for the 74LS00 U19 to provide better oscillator starting.

Software

Table 1 sets forth the port addresses used to send and receive by the C-64. These are all in the I/O1 section.

The video display board (here a 32K board from L. W. Interface) must be initialized before operation can begin. Port 57000 selects the pointer register of the 6845 video display chip. Port 57001 sends data to the control register. The values are by and large those set forth by K6AEP.

The user port data direction register is loaded with a "0" (zero) to set the port to receive, the port being at 56577. Location 53265 is loaded with a zero to shut down the C-64 display (Vic II chip) and prevent bus contention. Location 57004 resets the memory position counters on the display board. The data content is irrelevant. Merely addressing that port causes the reset.

The software routines build on ideas provided in other sources (see the references listed at the end of this article). Vertical sync is detected by the time duration of the signal, about 60 ms, as opposed to 5 ms for the horizontal sync pulse.

The program then passes to the receive function. This program uses four bits per pixel and 120 lines of video. The 8.5-,12-, and 16-second formats fill only one-half of the screen; the 36-second format fills the whole screen.

Table 2 explains the special function keys. Receive is selected by first pressing a key for length of picture, then pressing F1. The routine may be aborted by pressing INST/DEL. In the event that the abort doesn't work, hit RUN/STOP and RESTORE, then CLEAR/HOME-SHIFT. Then reenter the program by typing SYS 49152 and pressing the return key, which is the same way the program is started.

Once a picture is displayed, F3 will clarify the picture should the image on the screen differ from what is in memory. F5 will clear memory and display. Quarter frames may be expanded by hitting digits 1–5. Pressing "D" will cause the half-size picture from an 8-, 12-, or 16-second format to fill the whole screen.

Conclusion

The K6AEP circuit with an SSTV converter and ADC board works nicely with the

```
10 ; "VERTS"
12 VSYNC LDA PORTF
14 AND #1
16 BEQ VSYNC
18 JSR SYNCNT
20 LDA PORTF
22 AND #1
24 BEQ VSYNC
26 FIVE LDA PORTF
28 AND #1
29 BNE FIVE
34 JMP RCVA
60 SYNCNT LDA #247
62 STA 820
63 STA 821
64 STA 822
65 NON DEC 820
66 DEC 821
67 DEC 822
68 BNE NON
70 RTS
71 .FILE EXPAND
```

Program listing 5. The vertical sync detection routine.

```
10 ; "EXPAND"
20 VRT LDA #$03
21 STA 254
22 LDA #$3C
23 STA 253
24 LDA #120
25 STA 1020
26 NTQ LDX #64
30 NTD LDA (251),Y
31 STA PORTE
32 STA PORTE
33 STA (253),Y
34 INC 253
35 STA (253),Y
36 INC 253
37 DEX
38 BNE NTY
39 JSR NTT
50 DEC 1020
51 BNE NTR
52 JMP WAIT
53 NTR LDX #64
54 NTA INC 251
55 BNE NTB
56 INC 252
57 NTB DEX
58 BNE NTA
59 LDA #$3C
60 STA 253
61 LDX #64
62 NTY INC 251
63 BNE NTZ
64 INC 252
65 NTZ JMP NTD
66 NTT LDX #128
67 LDA #$3C
68 STA 253
69 NTS LDA (253),Y
70 STA PORTE
71 INC 253
72 DEX
73 BNE NTS
74 RTS
75 .FILE EXTEND
```

Program listing 6. The expand routine expands the selected quarter frame to fill the entire screen.

```
10 ; "EXTEND"
20 HRT LDA #$03
21 STA 254
22 LDA #$3C
23 STA 253
24 LDA #120
25 STA 1020
26 HTQ LDX #128
30 HTD LDA (251),Y
31 STA PORTE
33 STA (253),Y
34 INC 253
37 DEX
38 BNE HTY
39 JSR HTT
50 DEC 1020
51 BNE HTR
52 JMP WAIT
59 HTR LDA #$3C
60 STA 253
61 LDX #128
62 HTY INC 251
63 BNE HTZ
64 INC 252
65 HTZ JMP HTD
66 HTT LDX #128
67 LDA #$3C
68 STA 253
69 HTS LDA (253),Y
70 STA PORTE
71 INC 253
72 DEX
73 BNE HTS
74 RTS
75 .END INITIALIZE
```

Program listing 7. The extend routine expands the selected half screen (8, 12, 16 second) to fill the entire screen.

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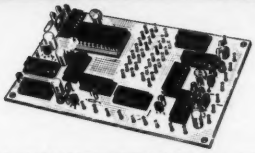

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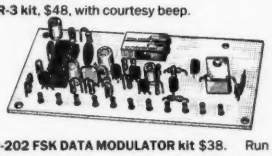

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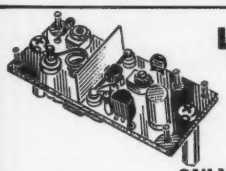

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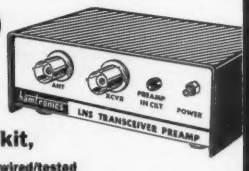

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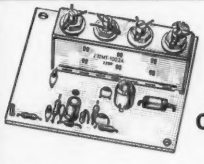

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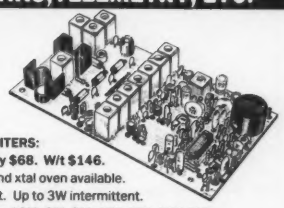

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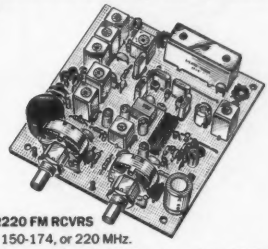

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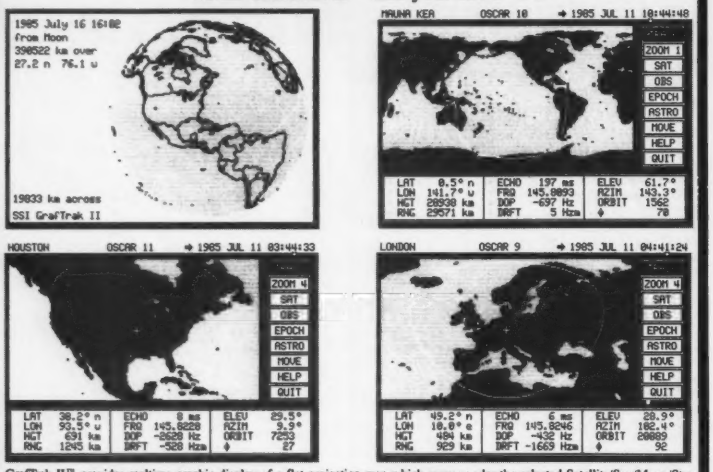

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C-64. The software is offered as a springboard for experimentation; further software development is possible to include perhaps a noise-cancelling feature and color and WEFAX for those who have an appropriately equipped station.

The program, incidentally, was constructed by assembly with a LADS assembler.[3] Don't be put off by the need for assembly language. It's easier than Basic in some respects and a good book will get you started. I found *Assembly Language Programming with the Commodore 64* by Marvin DeJong to be excellent. I would be happy to hear from those who carry out this experiment. ■

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1. "Color Computer SSTV," Clayton W. Abrams K6AEP and Dr. Ralph Taggart, *73*, November and December, 1984.

2. "Color SSTV and the Atari Computer," Martin F. Shick KA4IWG, *QST*, August, 1985.

3. *Compute!* Publications, PO Box 5406, Greensboro NC 27403.

4. *Assembly Language Programming with the Commodore 64*, Marvin DeJong, Brady Communications Co., Inc., Bowie MD 20715.

5. *Commodore 64 Interfacing Blue Book*, V. J. Georgiou, Micro Signal Press, PO Box 22, Millwood NY 10546 (1984).

6. MC6845 Data Sheet, Motorola Semiconductor Products, 3501 Ed Blustein Blvd., Austin TX 78721.

7. *CRT Controller Handbook*, Gerry Kane, Osborne/McGraw Hill, Berkley CA (1980).

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JENNINGS	RF1J	SPDT LATCHING	12	3.6	26.5 vdc	VACUUM	$65 ea
JENNINGS	RJ1A	SPDT	50	12	26.5 vdc	VACUUM	$125 ea
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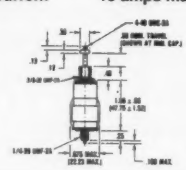

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On a number of occasions, I've owned various Drake radios. The R4–T4 series, as well as the 2As, 2Bs, and 2Cs, have passed through my hands. Each time I've sold a "2" series receiver at a hamfest, I've been barraged by amateurs who have asked if I would be willing to sell just the 2AC calibrator. Apparently, when most of the "2" series receivers were purchased, the plug-in crystal calibrators (2AC) were not. And now that the receiver is no longer in production, the calibrator is not available either.

It has been several years since I've owned a Drake 2C, but I recently spotted a very clean one at a hamfest and thought I might pick it up as a backup receiver. Unfortunately, the receiver lacked the 2AC calibrator unit.

Since my chances of finding one of the original calibrator units were slim, the next best thing was to build one. The handbooks were full of various designs for calibration marker units, but the designs were all state-of-the-art, utilized ICs, and, therefore, were more sophisticated than was really necessary. Further searching through the manuals revealed a tube-type crystal calibrator circuit designed by Swan Electronics Corp. (now Cubic Communications) for use with their earlier model 350C. With a few minor changes, the circuit was adapted for use in my Drake 2C.

The Circuit

The original circuit (see Fig. 1) called for a 12BA6 pentode in a modified Pierce crystal oscillator circuit, and it was turned on and off with a push/pull switch, which either grounded the cathode (completing the circuit) or un-grounded it (removing the B- return and opening the circuit). The Drake circuitry, on the other hand, switched the B+ line to the plate and screen when the front-panel switch was placed in the calibrate position.

"This calibrator should work well with almost any tube-type receiver or transceiver capable of supplying the appropriate filament voltage."

Most of the circuitry I used was identical to that used by Swan except that I substituted a 6BA6 for the 12BA6, so that the filament voltage would be compatible with my 2C, and the cathode was grounded directly to a grounding lug. I did not have the exact components in my junk box to duplicate the rest of the Swan circuit, but I found that the values of most of the components were not critical. The actual value of C1 may vary slightly as indicated in the parts list due to varying crystal capacitance.

I did make one other addition to the circuitry, and that was the placement of a 1N34 germanium crystal diode in series with the output. This diode provides a square-wave output (rich in harmonics) to allow for a higher calibrate level at frequencies above 7 MHz, where the calibrate level was especially low using the original circuitry. Fig. 2

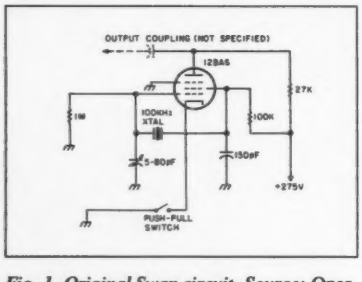

Fig. 1. Original Swan circuit. Source: Operation and Maintenance: Swan 350, *Swan Electronics Corp.*

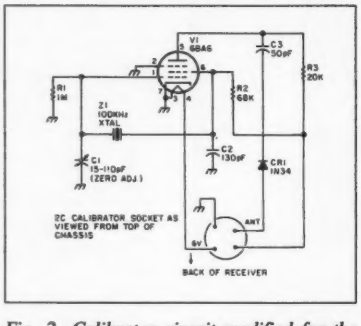

Fig. 2. Calibrator circuit modified for the Drake 2C.

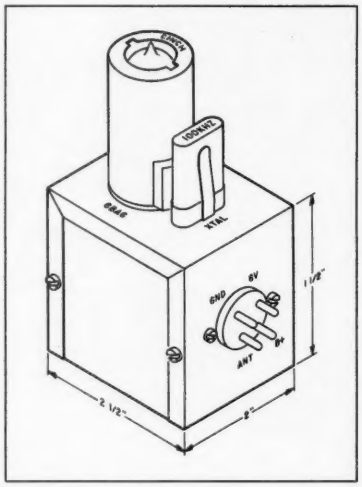

Fig. 3. General layout of the calibrator.

illustrates the final schematic diagram after changes.

Construction

The calibrator could have been included right on the 2C chassis. But not wanting to "spoil" the appearance or resale value of the receiver, I decided to make my calibrator a plug-in unit like the 2AC. The calibrator is housed in a homemade minibox that measures 2-1/2″ long by 2″ wide by 1-1/2″ deep. The placement of components is such that when the unit is plugged into the calibrator socket on the 2C's chassis top, the 6BA6 tube is above the 100-kHz crystal and should not cause adverse frequency drift during operation. When the unit is plugged in, a window at the top allows for adjustment of the frequency zero-adjust capacitor if you use a small screwdriver.

The parts placement is not critical except for the location of the crystal in relation to the 6BA6 tube as previously mentioned, and lead lengths should be kept as short as possible in the plate and grid circuitry. Fig. 3 illustrates the location of the major components.

Alignment

The alignment procedure is relatively simple if you have a crystal to cover the 10-MHz WWV range. With the completed calibrator plugged into its appropriate socket, turn the radio on, make sure that the 6BA6 filament is lit, and allow at least 20 minutes of warm-up time for the receiver to stabilize itself. Switch over to AUX crystal position to allow for use of a 14-MHz heterodyne oscillator crystal so that you can tune the 10-MHz band. Find station WWV with the MODE switched to AM (bfo off). Switch the function switch to CAL; you should hear the oscillator heterodyne beating against WWV. Adjust the ZERO capacitor on the plug-in calibrator unit until you hear a null (zero beat). At this point, your calibrator is calibrated with WWV and should provide a reasonably accurate frequency standard.

Parts List

C1	15–110-pF or 5–80-pF mica compression trimmer (see text)
C2	130-pF silver mica or polystyrene capacitor, 300 WV dc
C3	50-pF silver mica or disc ceramic capacitor, 300 WV dc (Increase the value for greater coupling.)
CR1	1N34 germanium diode or equivalent
R1	1-megohm, 1/4-to-1/2-Watt carbon resistor
R2	68–100k, 1/2-Watt carbon resistor
R3	20–27k, 1/2-Watt carbon resistor
V1	6BA6 7-pin miniature vacuum tube
Z1	100-kHz quartz crystal

Miscellaneous Parts

1	2-1/2″ x 2″ x 1-1/2″ aluminum minibox
1	7-pin miniature tube socket with cover
1	4-pin plug to mate with 2C calibrator socket
1	Crystal socket for .050 pins (HC-6 type)

Trimmer capacitor mounting bracket, grounding lugs, mounting hardware, hookup wire, and solder (60-40)

Although this calibrator was designed for the Swan 350 and adapted for the Drake 2C, it should work well with almost any tube-type receiver or transceiver capable of supplying the appropriate filament voltage (6 volts for 6BA6 or 12 volts for 12BA6) and between 150 and 250 V dc. ■

References

Byron Goodman W1DX, Editor, *The Radio Amateur's Handbook*, ARRL (1967).

Operation and Maintenance: Swan 350, Swan Electronic Corp., Oceanside CA (1967).

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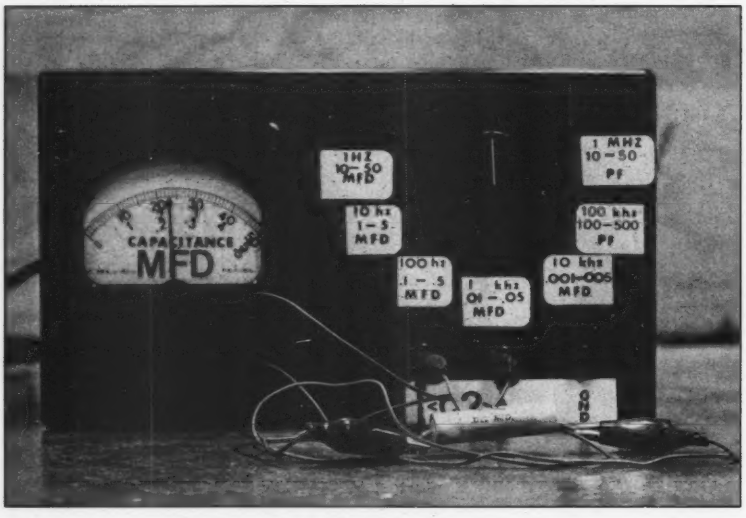

Photo A. VE6BGL's 1-pF–50-uF capacitance meter.

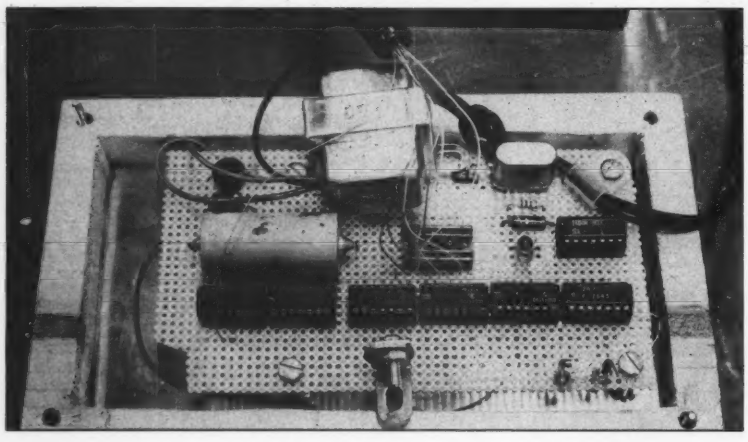

Photo B. Interior view.

The Jr./Sr. High School electronics students that I teach spend quite a bit of time cannibalizing consumer/industrial electronic equipment for parts. The kids get a good idea of how electronic devices are built and we also have a large communal supply of parts "on the hoof."

After a part has been removed, it is tested using an ohmmeter or transistor checker. Until now we didn't have a simple method of checking out capacitors. I did a survey of available commercial meters and found that most were digital and expensive. For student use I wanted something cheap, durable, and easy to fix. Necessity being the mother of invention, I came up with my own inexpensive analog capacitance meter.

After perusing several articles on the subject, I saw that all one needs is some sort of variable pulse generator and a meter circuit to measure the amount of voltage "leaking through" the capacitor. This amount would be a function of the frequency used and is basically capacitive resistance (I remembered that from the Advanced exam).

Construction

The junk box produced a piece of perfboard complete with a couple of crystals and wire-wrap sockets. I recently discovered wire-wrap—it is fast, easy, and highly recommended. The whole project was wire-wrapped in 90 minutes, and it beats the heck out of etching circuit boards.

With the exception of the crystal, all of the parts should be readily available. To generate the pulses, I first used a 7404 hex inverter as a 1-MHz oscillator and then successive 7490 decade divider chips to divide the frequency down to 1 Hz. There is nothing sacred about the frequency of the crystal—it was what I had on hand. It would be fairly easy to use a 2-, 3-, 5-, or 10-MHz crystal and divide it in a similar fashion to get the same result.

I used a surplus 1-mA meter movement and carefully removed it from its case in order to redo the scales with press-on transfer lettering. The remaining 7404 inverters were put in parallel and were used to drive an LED, which blinks on and off at 1 Hz and gives you a good idea if the thing is working or not. My LED is still mounted on the perfboard but will soon be on the front panel.

Power for the beast comes from a surplus transformer, two diodes, a 7805 regulator, and a 500-uF capacitor. This is your basic 5-volt power supply, and you can build it with whatever you happen to have available. Use the low-power version of the 7490s if you have them, as battery power might then be possible.

To use the meter, set the switch to the highest range (1 MHz) and connect the unknown capacitor across the clock output and the meter input jacks. Rotate the switch to the right lower range (this is the one before the meter goes "ping" on the stop) and read the value from the meter on the correct scale.

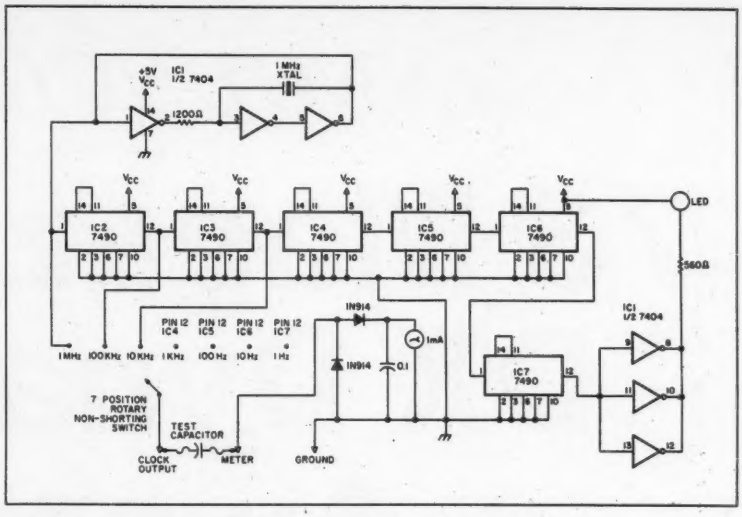

Fig. 1. Schematic of the capacitance meter.

Other Uses

If you have a spool of coaxial cable and need to know how much is left (without unrolling the entire spool), all you have to do is connect the cable to the meter, take a reading (in pF), and divide it by the manufacturer's spec for the cable (in pF/foot). The resulting quotient is the length of the cable in feet. The same method could be used to locate the position of a break in the cable. For example, a cable 100 feet long, with a capacitance of 5 pF/foot, should have a reading on the meter of 500 pF. If your meter reading is 200 pF, you know that there is a break in the cable 40 feet from the end where the meter is.

Another use appeared when I turned on the hand-held to answer a call on our local repeater. This gadget makes a dandy marker generator right up to 147.000 MHz and then some. For oscilloscope owners, it can also be used as a timebase generator to measure frequency by using Lissajous patterns.

I hope you enjoy this versatile piece of test gear. Get out there and build something again! ■

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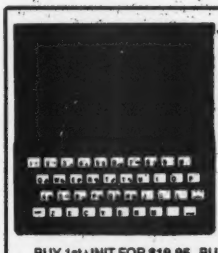

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See September 1984 issue of 73 for TIMEX/RTTY article

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One day not too long ago the staff of *73* was sitting at lunch over at The Folkway talking about DX and DXing and how crazy DXCC had gotten. The DXCC Honor Rollers have nothing left to work, and folks coming into the program have no hope of working countries that haven't been on the air for twenty years.

By the time we got around to coffee and mocha chip cake we had decided to start our own DX award. We wanted everybody to start with zero countries to liven things up a bit on the bands. Wayne suggested that we add to the ARRL's DXCC countries list by searching through the awards programs of IARU members. We decided to offer endorsements for every mode we could think of.

We want you to *have fun* with this award. The rules are simple, but the variety of levels and endorsements makes the award a challenge for both the beginner and the experienced DXer. We've come up with nearly 400 countries, so you'll not soon run out of things to work!

The Award

The basic award will be issued for 100 countries worked. Endorsements will be made for 150, 200, 250, 300, 350, 375, and 400 countries worked. The basic award is mixed-mode.

Special endorsements are available for single-band operation and for specific modes, including CW, SSB, satellite, Baudot RTTY, ASCII RTTY, AMTOR, packet, spread-spectrum, QRP (less than 5 Watts output), EME, FM, AM, FAX, and SSTV. Logs submitted for special endorsements must clearly indicate the band and mode used for all contacts.

The Rules

Effective Date: Only contacts made after 0001Z on January 1, 1987, will be eligible for the DXD Award.

Bands: Contacts may be made on any amateur band except 10 MHz. No cross-band contacts are allowed.

Modes: Any mode available to amateurs in your country may be used. Cross-mode contacts are allowed: The mode that *you* are using is what counts for the DXD Award.

Minimum report: There is no minimum signal report (you can't work 'em if you can't hear 'em).

Applications: QSL cards are not required for the DXD Award. Application must be made on an official DXD form, available from *73* Magazine—send an SASE to WGE Center, Peterborough NH 03458, Attn: DXDA. On the form, list your contacts in callsign order, indicating date, time, frequency or band, mode, and power. We may, on occasion, ask to see your log, so no funny business.

Fees: The fee for the basic award, due upon application, is U.S.$6. IRCs are not accepted. Each additional endorsement is U.S.$2. *Note: Endorsements requested on your first application are free.*

Country Criteria: Countries on the DXD Award list are taken from the awards programs of IARU member nations. If you come across a country not on the list that you feel should be included, send a copy of award rules from an IARU member which lists that country as being valid for an award to *73* Magazine for evaluation. New countries will be added as needed and announced in *73*.

Countries List: The DXD Award countries list will be printed from time to time in *73*. A copy of the current list (just under 400 countries, but still climbing) and an official application form are available from *73* Magazine, WGE Center, Peterborough NH 03458, Attn: DXDA.

Ready, Set...

Who will be the holder of DXDA #1? Who will be the first to hit the 300 country mark? Everyone has an equal shot at it, starting January 1st. We'll publish a list of DXD Award holders every month so that you can see how you are doing.

Excuse me, I see that it's 0001Z... CQ DX, CQ DX, CQ DX... ■

To receive a copy of the current DX Dynasty Award countries list and an official application form, send an SASE to *73* Magazine, WGE Center, Peterborough NH 03458, Attn: DXDA. *73*'s DX Map of the World is available for $5 ppd.

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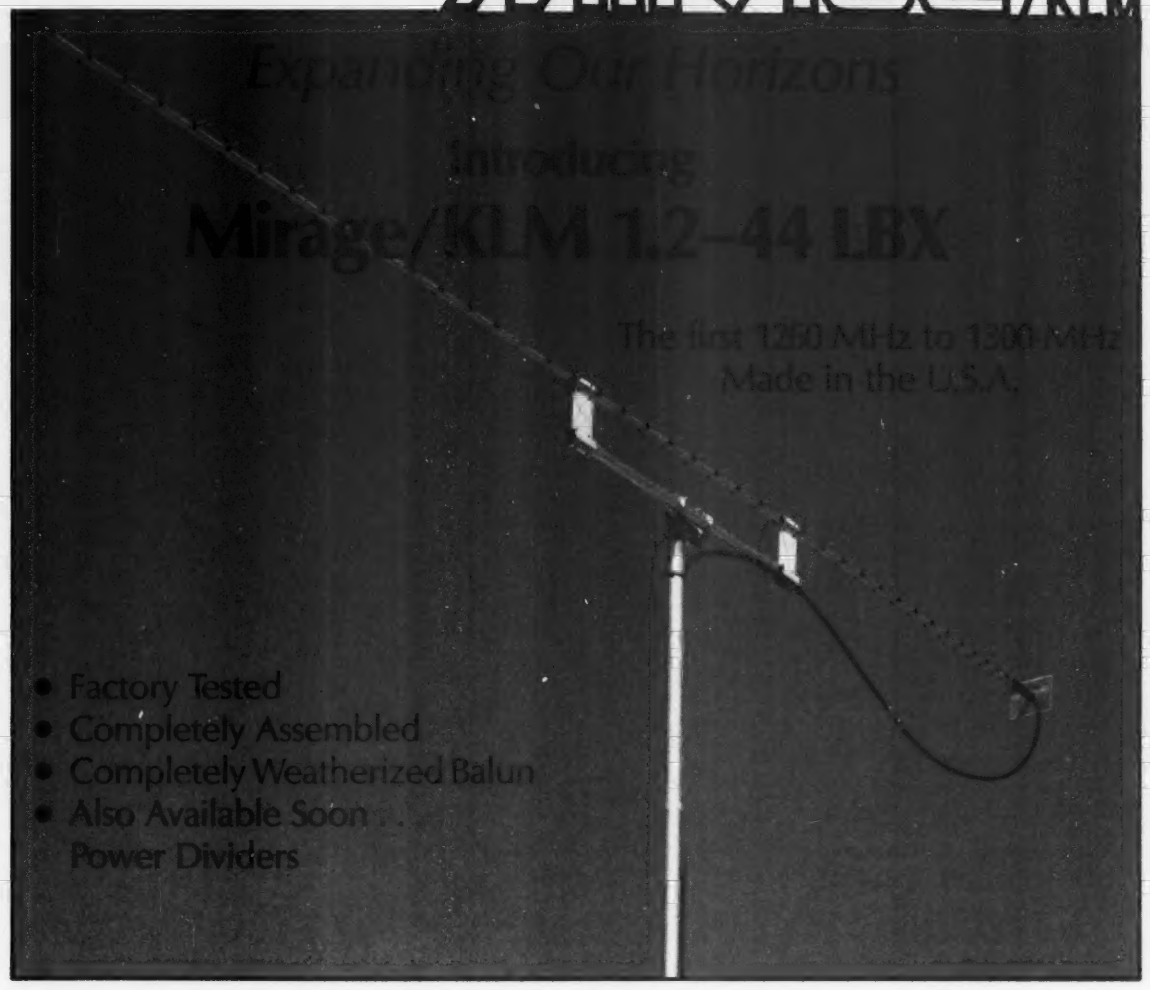

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Electrical

- Band Width ..... 1260–1300 MHz
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- Balun ..... 4:1 Rigid Coax

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EQUIPMENT EVALUATION

This month I want to take a look at three items of commercial equipment and hit a few news items. Before I look in detail at the equipment, a few words are in order about the mini-reviews you will see from time to time in this column.

Whenever possible, evaluations of equipment and software will be based on actual use, but they must also be unbiased. It is quite possible to negotiate all sorts of special prices on gear if you are going to review it in a column like this. Unfortunately, that is not the way to retain your objectivity since you feel obligated to the supplier in direct proportion to whatever discount or special consideration you were able to obtain.

Whenever you see items covered in this column, they will have been obtained in one of two ways. The first is by direct purchase, just like any other consumer. I will obviously shop for the best discount, but it will always be a "public" discount that anyone else could obtain by shopping at the same source.

The second approach is a direct loan of the gear for a period of a few weeks. In most cases, such equipment is returned when the evaluation is complete. If I can't live without it, I will purchase the gear at the standard rate and let you folks know. All this may seem a bit elaborate, but you have a right to know the conditions that might impact an evaluation.

GaAsFET Preamp

In my review of receiver options (November, 1986), I noted the versatility of some of the new wide frequency range scanners. The primary difficulty with such receivers is that they are almost impossible to modify internally, leaving you to use the wide bandwidth position (typically 100 kHz or more) for FM satellite reception.

In order to use such receivers effectively with omnidirectional polar-orbit antennas, some really low noise preamplification is required. GaAsFETs, with noise figures below 1 dB, are obvious candidates. Most two-meter GaAsFET amplifiers are quite expensive, so I was pleasantly surprised to note the Hamtronics ad (65-D Moul Road, Hilton NY 14468; 716-392-9430) in *73* which featured several two-meter units in the $35 to $80 range. I placed a phone COD order for one of their LNG-144 units ($49) and it arrived in just a few days.

This particular unit is mounted in a small plated metal case and has a claimed tuning range of 137–150 MHz, a noise figure of 0.7 dB, and about 18 dB of gain. The units come tuned for two meters (special tuning was not available), and the documentation notes that the amplifier is suitable for mast mounting and is easy to retune for other frequencies in the operating range. The amplifier is designed to operate from 12–14 V dc and features internal zener regulation that should make the power-supply regulation relatively uncritical.

First the nit-picking and then on to the good stuff! The unit is *not* easy to retune with equipment that most folks will have available. I have some excellent weak-signal sources, yet I was unable to find a real signal peak when the unit was retuned to 137.5 MHz. There are combinations of input and output tuning where the unit *will* oscillate (very obvious), but they are easily avoided. I suspect that the amplifier is quite broadbanded, and would suggest that you use it as set at the factory, at least initially.

Second, the unit is *not* suitable for mast mounting as it arrives from the factory. The little metal case is open at the bottom and will require a sealing plate when tuning is complete. I don't know how the plating will stand up to the weather, but the BNC connections and the dc tap will require weather sealing if they are directly exposed to the weather. A ventilated enclosure to keep the worst of the weather off the unit is probably a good idea.

Now the promised good stuff! The unit does deliver good gain, with a major reduction in the noise floor compared to the quiet JFET circuit I have been using. With the LNG amplifier in the line, the performance of my wideband scanner is now almost equal to the matched bandwidth receiver with the JFET amplifier in polar-orbit service; that is quite acceptable given the frequency agility of the scanner. With the LNG ahead of the matched bandwidth receiver, signals pop up to full quieting as soon as the spacecraft clears the horizon when I am using my omnidirectional Zapper antenna from the *WSH*.

A preamp like the LNG unit will *not* solve the problem of WEFAX reception using a wideband scanner. Most WEFAX downconverters employ a low-noise i-f preamp in the converter, and it is this device that sets the VHF noise figure. Those with a yen to experiment may want to look at hooking the LNG or similar amplifier *directly* to the output of the converter mixer—that may be enough of an improvement to let the system work at a wider bandwidth.

One factor that I am happily not in a position to evaluate is the effect of rf pollution on the performance of the LNG/wideband-receiver combination, since I am located in a rural area. Wide frequency range scanners are subject to intermod and spurs, and it may be necessary at some locations to look at a helical resonator filter (Hamtronics has inexpensive units in their catalog).

If the scanner is the big contributor, installing such a filter between the amplifier and the scanner should help without noticeably degrading system performance. If the amplifier is contributing, which should be less common since GaAsFETs are hard to crunch, the filter will have to go up front and that will degrade the noise figure by the value of the filter insertion loss. Such a decrease is strictly relative, however, since you would probably face the same problem with any amplifier if your local rf density is enough to bother the GaAsFET!

The LNG-144 is certainly a good buy at the price, and there are several other models of similar performance that might be of interest. Hamtronics' LNW series (available in a 120–150-MHz version) is a small, unpackaged amp available as a kit for $19 or wired for $34. This unit is quite small and might be a good candidate for retrofitting into an existing WEFAX converter.

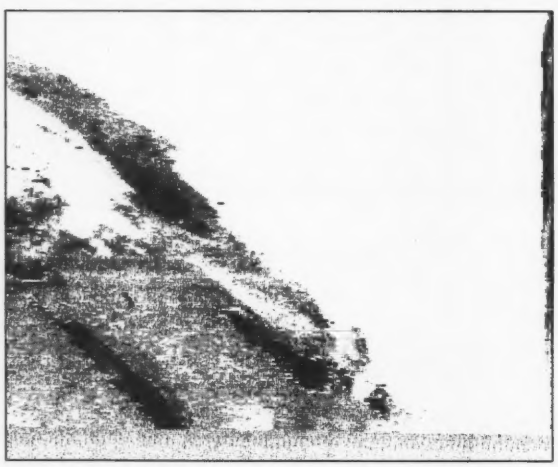

Photo A. GOES Central relay of a NE quadrant from the European METEOSAT spacecraft in IR. The original image was displayed on the WSH *scan converter and printed on the P-50U video printer. The Red Sea is visible in the lower left and the eastern end of the Mediterranean is just visible. Some readers have commented that they have trouble interpreting the features of the METEOSAT images carried on the GOES schedule. This is due to several factors including relatively lower contrast of METEOSAT IR imagery (the only ones we get!), the smaller geographic area covered by each quad, and the fact that the pictures are transmitted upside down!*

Scan Converter Hard Copy

Scan converters are unequaled in their operating versatility but have one major drawback—what do you do if you need a copy of a particularly interesting picture? Up to this point, the

hard-copy alternatives were limited to programming your system to print the image on a dot-matrix printer or photographing the display.

With all due respect to hard-working programmers (see next review), there is a limit to what can be accomplished using a dot-matrix printer and photographs. While they are of excellent quality, they also take time to obtain. One answer is the growing range of video printers that are becoming available to service the rapid growth in video-related fields.

All video printers are essentially special-purpose FAX machines. They contain a solid-state memory and grab and store a single frame of video from a camera, VCR, computer terminal, or, in our case, a scan converter. Once stored, the image is controlled by a built-in microprocessor and printed using, in most cases, thermal paper that is fed from a roll.

Mitsubishi Electric (800 Biermann Court, Mt. Prospect IL 60056-2173) has a growing line of video printers with a variety of capabilities as I discovered in a pleasant meeting with William Dulaney, Jr., their OEM/Industrial Video regional sales manager for my part of the world. Bill was kind enough to leave one of the P-50U printers for my evaluation, plus some literature on more advanced models.

The P-50U printer has been around for a few years now, and you may have seen one at the Robot booth in Dayton two years ago where it was constantly generating prints from their 450C and 1200C scan converters. The P-50U is a fairly compact box about 8.5 inches wide, 4.5 inches high, and a shade over 14 inches deep. Prints feed out of a slot in the front of the machine and operating controls are minimal. The resulting prints are about 4 inches wide and 3.25 inches high. The printer reproduces 16 grayscale shades and has a horizontal resolution of 280 picture elements per line and a vertical resolution of 234 lines. A single roll of the white thermal paper will print approximately 220 pictures at a cost of a few cents per print. List price for the P-50U is about $400.

Operationally, the P-50U is extremely easy to use. Interconnection to existing systems is quite simple. You run a video cable from your scan converter to the video input jack with another cable from the video output jack to the input of your monitor.

Three small front-panel pushbuttons control contrast (light, normal, and dark). There are two large front-panel pushbuttons for PRINT and COPY. If you have a picture you would like to save, you simply hit PRINT and the image feeds out the front slot. The literature says this takes 15 seconds. I timed it at 20, but the bottom line is that it doesn't take long! The COPY switch is used to make additional prints of the image in the P-50U memory even if the image on the display has changed.

Two additional controls on the front panel add to the unit's versatility: a P-FEED switch, which simply feeds the paper, and a PRINT switch (smaller than the main PRINT switch), which can be set for a positive (normal) or negative printout. There is also a scan switch with a normal and a reverse position that can be used to invert images.

The P-50U did deliver as promised, yielding prints from the output of the *WSH* scan converter without any fuss or bother. Two samples of typical prints, one of a METEOSAT frame and another of a GOES E SE quad (IR), are reproduced in Photos A and B.

Close examination of a number of prints, however, did indicate that the tonal resolution, as viewed on the monitor, was greater than that produced by the printer. The reason quickly became clear when the scan converter was used to generate a grayscale from which a print was obtained. The original grayscale had eight steps and was repeated twice for each line (two grayscale cycles per line).

"There is a limit to what can be accomplished using a dot-matrix printer and photographs."

Each step, from black on the left through white on the right, was clearly differentiated on the monitor but not on the printout (even after all levels into the P-50U had been optimized for best reproduction). Clipping or compression is evident at both ends of the grayscale. Step 1 (black) and step 2 appear as a single broad stripe. Similarly, step 8 (white) and the preceding step (7) are not resolved, but appear as a broad white stripe. The P-50U's sampling or best reproduction (I don't know which) is clearly centered around the middle of the dynamic range, missing fine gradations at the black and white ends.

The problem is a bit more serious than might at first be assumed, since the scan converter generates a total of 16 grayscale steps, with additional values intermediate between each of these values. In reality, at least four and possibly five of the total of 16 are missing in the P-50U reproduction!

The only remedy for this difficulty is to reduce the dynamic range of the video output to match the capabilities of the printer, but this results in a rather washed-out image compared with the crisp tones of the original. One of the big challenges in designing a scan converter like the *WSH* unit is to obtain good dynamic range on the output video while still maintaining solid sync. Having achieved that, it hardly makes sense to throw it away just to keep the printer happy! While the prints lack the crispness and dynamic range of a *good* photograph—one that you print yourself to optimize contrast—they are certainly useful and much easier to obtain.

An improvement in image quality was obtained with a slightly roundabout approach. My operating software for the *WSH* scan converter contains a COMPLEMENT function, which permits you to display a negative version of the image in memory. When the negative printing function of the P-50U was used on such a negative display image, the result was a normal positive print but one with noticeably better grayscale rendition!

Since the printer was a loaner, I did not open it up to see if the sampling range or printer output was adjustable. It is possible that you could tweak the system for a closer match to your scan converter output.

One extremely curious anomaly did pop up for which I was unable to provide an explanation. I hooked the P-50U up to the output of a Wrasse 665 scan converter to make some one-on-one comparison prints against the *WSH* scan converter, and I was astonished to find that the printer would not lock on the signal, yielding a print that looked like a TV picture with a slightly maladjusted horizontal-hold control. Nothing I was able to do would lock the picture, despite the fact that it would lock up on any of the station monitors.

The curious fact is that this inability to lock was a worry I had had with regard to the *WSH* scan converter. That unit uses a slightly off-standard horizontal and vertical sync rate to simplify the FAX and TV timing circuits. It can easily be locked up on any monitor,

Photo B. GOES Central transmission of a SE IR quad from GOES E showing much of South America. Display and printing match the previous example. The image was obtained in the early evening, and ground heating in coastal Chile and Argentina is evident from the darker tones of these land areas.

but it will always require slight readjustment of the vertical- and horizontal-hold controls unless the monitor or TV set uses a PLL sync-recovery circuit. The P-50U employs such a circuit because it does not have any sync-lock controls.

As the prints indicate, it had no trouble locking to the *WSH* scan converter output but would not lock to the FX-665 output, even though the Wrasse unit appears to be closer to broadcast standard, based on the settings of the monitor hold controls. I suspected that the P-50U might be out of adjustment, but a few prints were run from broadcast and videotaped signals with no problems.

Be aware that you *may* have a problem printing from the output of a FX-665, but I don't know why. I want to emphasize again that I have *never* had a problem locking the output of my 665 to any monitor I have used, so you shouldn't expect any problems with basic display.

The second generation of Mitsubishi printers looks quite exciting. The P-60U looks a lot like the P-50U and has many of the same features, but with expanded performance specs. The P-60U will produce images with up to 64 grayscale steps with a resolution of 640 pixels/line and 512 lines! In addition, it will handle NTSC, PAL, and SECAM video and RGB TTL, and it has a parallel port for computer graphics and titling! The P-70U has all of the features of the 60 but produces an 8-1/2" x 11" printout! The expanded dynamic range of these second-generation printers may result in a better match to most scan converters, but even if this is not the case, they sure beat fiddling with a camera for routine hard copy.

Line-Printer FAX

In reviewing various approaches to FAX image display in an earlier column, I neglected one avenue that seems to hold the interest of many—the use of a line printer to produce a picture. Most of the time this has been handled by a computer that formats the image for printing, but now a dedicated unit is available to perform this function. The unit is the Info-Tech M-800 FAX Converter, which is designed to take FAX input and output the image to a dot-matrix printer. This unit has its own microprocessor, so you do not need an accessory computer to run it.

Date	01 March 1987	
Spacecraft	NOAA-9	NOAA-10
Orbit Number	11406	2337
Eq. Crossing Time (UTC)	0001.9	0016.02
Longitude Asc. Node (Deg. W.)	135.15	70.96
Nodal Period (Min.)	102.0851	101.2766
Frequency (MHz)	137.62	137.50

These orbital parameters are projected two months in advance due to deadline considerations. Accumulated errors due to uncompensated orbital decay and other anomalies result in expectation of errors up to two minutes and possibly as many degrees in terms of the crossing data and possible small changes in the indicated period. Users requiring precision tracking data should rely on more current sources.

Table 1. TIROS/NOAA orbital predict data.

The M-800 was brought to my attention by Fred Osterman of Universal Shortwave Radio (1280 Aida Drive, Reynoldsburg OH 43068; 614-866-4267), one of the major marketing outlets for the M-800. The M-800 will handle both AM FAX (weather satellite format) or FM (1,500-Hz black to 2,300-Hz white), which is almost universally used for shortwave FAX broadcasts. The unit will accept 60-, 90-, 120-, and 240-lpm FAX signals, with selection of several indices of cooperation. It is powered from a 12-V wall-mount transformer/supply and features easy hookup between the receiver and printer. DIP switches inside the M-800 are set to match the printer you will be using. The instruction manual concentrates on use with the Epson FX-85 and LQ-800 printers, although supplementary information is provided on other compatible printers as noted by M-800 owners.

The printer turns out to be one of the most critical factors with regard to the performance of the M-800. The unit has limited video buffer capacity and must operate very close to real time. If it is to be able to keep up with the FAX signals, it must print as many lines as possible with each pass of the print head, which is where the real performance break occurs.

Relatively inexpensive printers (such as the FX-85) have eight or nine wire print heads, limiting them to fewer lines per printing pass in comparison with high-end dot-matrix printers (such as the LQ-800), which have 24 pin heads. Everything else being equal, the LQ-800 can handle a faster format than the FX-85 simply because it prints more lines on each printing pass.

The type of video is also a factor. The M-800 can be switched to handle line (black or white) or grayscale video. Grayscale video requires more manipulation during each pass so that a given printer can handle a faster format with line video than it can in the grayscale mode. These two factors interrelate in the following way with regard to the 120- and 240-lpm formats of greatest interest to satellite types:

	120 Lpm	240 Lpm
LQ-800	Grayscale/line	Line only
FX-85	Line only	—

The LQ-800 could handle side-by-side NOAA or standard METEOR display in the grayscale mode at 120 lpm and would also be suitable for WEFAX charts at 240 lpm. The FX-85 is not useful for satellite work since the best it can accomplish is side-by-side chart display at 120 lpm from WEFAX chart transmissions, and this results in considerable reduction in resolution and problems with aspect ratio.

These constraints are not very significant for HF work since charts are transmitted at 120 lpm, while wirephotos, where grayscale reproduction is desirable, are usually transmitted at 60 or 90 lpm. Thus the M-800 linked to an FX-85 will handle virtually all useful HF products. For satellite work, you would need a printer with the capabilities of the LQ-800 for NOAA, METEOR, and WEFAX charts, and even that printer could not handle WEFAX products in the grayscale mode.

The M-800 does a very fine job on line charts, and resolution is equivalent and contrast superior to the typical FAX recorder. The grayscale output is quite reasonable when viewed from a modest distance. The M-800 unit I received worked straight out of the box when connected to an RX-80 printer using a standard printer cable.

Copy was excellent with 120-lpm HF chart transmissions, and all the phasing and auto-start functions worked perfectly. The charts were of very high quality, and I would suspect that with the better printer, full resolution charts via WEFAX would be a snap. I did check out the start and phasing functions on WEFAX and they worked perfectly, although the printer was not suitable for delivering full resolution at that speed.

If you have an interest in HF FAX, you should definitely look at the M-800 as an alternative to an expensive FAX machine. For satellite work, you must have the high-quality printer if you expect to get usable copy.

The only real drawback to the M-800 is the printer noise. It is acceptable for occasional use, but if the printing schedule were heavy, I would want the printer in another room! I should note that line printing is quite a bit quieter than grayscale.

Operating expenses for the system are quite reasonable, consisting primarily of standard printer paper and a ribbon re-inker (a necessity if you will be doing a lot of printing, particularly in the gray-

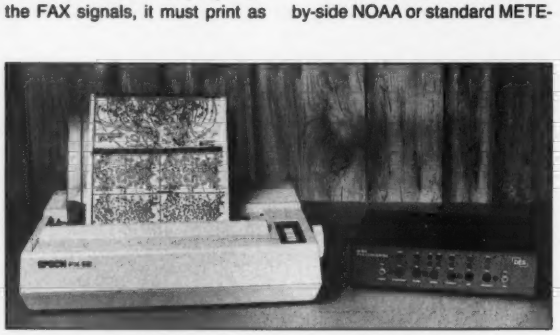

Photo C. The Info-Tech M-800 FAX converter and an Epson FX-85 printer. Photograph courtesy of Universal Shortwave Radio.

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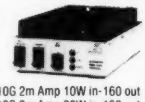

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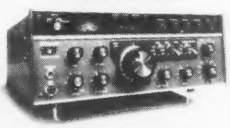

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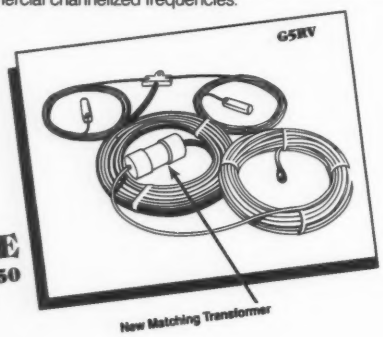

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Drive Power: 100W Nominal for 1500 Watt SSB PEP output, 125W Nominal for 1500 Watt CW output.
RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.
Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC
Harmonic Suppression: -50 dB minimum.
Intermodulation Distortion Products: -33 dB down minimum.
Circuit Type: Class AB_2 grounded grid. Type of Emission: SSB, CW, RTTY, AM, SSTV
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scale mode). The M-800 would certainly be the system of choice for printing an occasional 120-lpm chart from HF and, with the better printer, could serve the same role for WEFAX charts.

News

The first item concerns the deactivation of NOAA-6 now that NOAA-10 is operational. This is no news to most of you but may persuade the occasional listener to stop looking for this particular bird.

Soviet METEOR/COSMOS watchers should concentrate on 137.30, 137.40, and 137.85. I am still looking for a reliable news feed to keep up-to-date on Soviet weather satellites, so hang in there.

The final item this month concerns variations in GOES C signal levels. The problem is that this spacecraft is now running short of fuel, resulting in accumulating plane errors in the orbit and a slight slippage in strict geostationary geometry.

The spacecraft now appears to move in a figure-eight pattern in the sky on a 24-hour basis. Depending on your antenna pattern, the spacecraft may be moving out of your main lobe at specific times of the day. The bigger the antenna, the greater the problem due to the narrower pattern of the bigger dishes. Small dishes, despite the broader main lobe, are not immune since they have lower gain and hence a smaller system gain margin.

Since the spacecraft end of the problem will be with us and probably will get worse, until Central is ultimately replaced, we have only two alternatives. The simple approach is to decide what time of day we want optimum reception and simply readjust the antenna for solid reception at that time. The second and most complex alternative is to install motorized adjustment for both elevation and azimuth (a relatively small range of adjustment will do) and then repeak the antenna when the signal starts to fall off.

Note

References to *WSH* refer to the third edition of the *Weather Satellite Handbook*, available directly from yours truly for $12.50 plus $1 postage in the U.S. and $2 elsewhere.■

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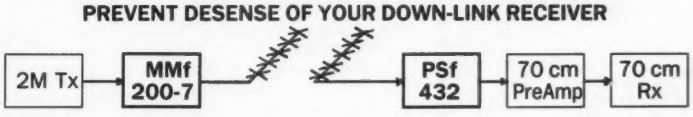

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SPECIAL EVENTS

PLAINWELL MI
MAR 1

The 1st annual State Technical Institute Hamfest will be held on March 1, from 8 a.m. to 4 p.m., at the school grounds at 33 Alber Drive, Plainwell, Michigan (located 15 miles northeast of Plainwell on Pine Lake). Admission is $2. Single tables $3. VEC examinations given. Talk-in on 146.46. For information and table reservations, write to Robert Mousseau KA8VVM, State Technical Institute, 33 Alber Drive, Plainwell MI 49080, or call the school at (616)-664-4461.

WINCHESTER IN
MAR 1

The Randolph ARA will sponsor the Randolph Amateur Radio Hamfest on March 1, from 8 a.m. to 3 p.m., at the Winchester National Guard Armory. Admission is $3 in advance, $4 at the door. Children 12 and under free with adult. 3' x 8' table space $5 (tables limited); space only, $3. Electronics and amateur radio exams. Talk-in on .90/.30 and 224.90/223.30. For more information, contact RARA, c/o Kedrick Robbins W9QUH, Rte. 1, Box 389, Parker City IN 47368; (317)-468-6568, or Jake Life W9VJX, 407 High Street, Winchester IN 47394; (317)-584-9361.

CHICOPEE MA
MAR 1

The annual MTARA flea market will be held on March 1, from 10 a.m. until 3 p.m., at the K of C Elder Council 69 Hall, Granby Road, Chicopee, Massachusetts. General admission is $2, spouse and kids free. Tables are $10 at the door, $8 in advance. Tailgating, $5. Walk-in amateur license exams given at 10:30 a.m. Talk-in on 146.34/146.94 and .52. For more information, write to MTARA, Box 3494, Springfield MA 01101, or call Bob WB1EQS at (413)-532-4891 (days) or Mickey N1CDR at (413)-562-1027 (evenings).

NEWBURGH NY
MAR 1

The Mt. Beacon ARC will hold its first annual Winter Hamfest on March 1, from 8 a.m. to 3 p.m., at the State Armory in Newburgh, New York. The armory is off the intersection of Interstates 84 and 87. General admission $3. Space for your table $4. Table provided for $5 with advance reservation. Talk-in on 146.37/.97 and 146.52. For reservations and information, contact Stan Disbrow WA2KQY, c/o Mt. Beacon ARC, PO Box 841, Wappingers Falls NY 12590; (914)-876-1659.

MORRISTOWN TN
MAR 7

The Lakeway ARC will sponsor its annual Swapfest on March 7 at the Tally Ward Recreation Center in Morristown, Tennessee. Vendor setup at 7 a.m. FCC VE exams will be given. Talk-in on .63/.03. For more information, contact Dennis Livesay KB4LSX, 3214 Horner Drive, Morristown TN 37814. Please send an SASE.

FORT MYERS FL
MAR 7

The City of Palms annual hamfest will be held at the Moose Hall on Parkmeadow Drive on March 7 from 9 a.m. to 4 p.m. Talk-in on .28/.88. For more information, contact Harry Arnold K9ALX, 5414 Brandy Circle, S.W., Fort Myers FL 33907; (813)-482-3113.

MILWAUKEE WI
MAR 7

The Milwaukee School of Engineering ARC W9HHX will hold its annual hamfest on March 7, from 8 a.m. to 2 p.m., at 1121 N. Milwaukee Street, downtown Milwaukee, Wisconsin. Tickets are $2 and 4-foot tables are $3. Talk-in on 146.19/146.79 and 146.52. For information, tickets, or tables, send SASE to W9HHXFEST, PO Box 644, Room C-6, Milwaukee WI 53201-0644.

CAVE CITY KY
MAR 7

The annual Glasgow Swapfest will be held on March 7 at the Cave City Convention Center, in Cave City, Kentucky. The swapfest will start at 8 a.m. Central time and will continue until everyone goes home. Admission is $3 per person. Extra tables are available at $3 each. FCC VE tests will begin at 10 a.m.—walk-ins only. Talk-in on 146.34/.94 and 144.59/145.19. For additional information, write to N4HCO, Rte. 9, Box 112B, Glasgow KY 42141.

VALHALLA NY
MAR 8

WECAFEST '87, the Western Emergency Communications Association's third annual hamfest and electronics fair, will be held on March 8, from 9 a.m. to 3 p.m., at Westchester Community College in Valhalla, New York. Admission is $3 for adults, with young people under 16 admitted free. FCC license exams given. Talk-in on 147.66/.06, 146.52, 222.80/224.40, and 442.475/447.475. Dealer inquiries should be addressed to WECAFEST '87, PO Box 348, Millwood NY 10546.

INDIANAPOLIS IN
MAR 8

The Morgan County Repeater Association will sponsor the Indiana Hamfest on March 8, beginning at 8 a.m., at the Indiana State Fairgrounds' Pavilion Building in Indianapolis, Indiana. Admission is $5 at the door. 8-foot flea market tables (including space) $8 each. No space will be sold without table. Advance reservations suggested. Talk-in on 145.25. For table reservations or information, send an SASE before February 25 to Aileen Scales KC9YA, 3142 Market Place, Bloomington IN 47401; (812)-339-4446.

MADISON NJ
MAR 13

The Splitrock ARA will sponsor its second annual Evening Hamfest on March 13 at Drew University Center, Room 107, Rte. 24, Madison, New Jersey. Doors open at 7 p.m. Admission for buyers, $2. Tables available in several sizes from $2 to $8 per table. Talk-in will be on 146.985 outside Madison area or on 146.58 in Madison area. For further information, write to SARA, PO Box 3, Whippany NJ 07981, or call Steve Halliburton WA2SOC at (201)-366-9642.

ST. LOUIS MO
MAR 13

The Jefferson Barracks ARC will hold its 27th annual Amateur Radio Auction on March 13, beginning at 7:30 p.m., at the Concordia Turners Hall, 6432 Gravois, in south St. Louis City, Missouri. Talk-in on .52, 146.94, or 145.21.

RATTLESNAKE ROUNDUP
MAR 13–15

Nolan County ARC of Sweetwater, Texas, will operate a special-event station during the World's Largest Rattlesnake Roundup on March 13–15. Operation will be on the 20- and 40-meter General phone bands from 1500–2400 UTC. For a certificate, send a large SASE and QSL to WR5B, Rte. 2, Box 121-A, Sweetwater TX 79556.

FAIRBANKS ICE FESTIVAL
MAR 13–22

The operators in and around the local area of Fairbanks, Alaska, in cooperation with the Arctic ARC and North Star Borough, will be running special-event stations for the Fairbanks Ice Festival (March 13–22) and the Yukon Quest Sled Dog Race, which starts at the end of February. Look for stations on 10–160, most modes. Special QSLs will be available via the station worked. All cards will go via the bureau unless an SASE or SAE and return postage are supplied.

HUDSON NH
MAR 14

The Interstate Repeater Society of Derry, New Hampshire, will hold its annual flea market on March 14, from 8 a.m. to 4 p.m., in Hudson NH at the Lions Club Hall, Lions Avenue. Admission is $1 and tables are $8 each. Talk-in on 146.85. Call for table reservations at (603)-623-0628 or (603)-883-9441, or write to IRS, PO Box 693, Derry NH 03038.

MIDLAND TX
MAR 14–15

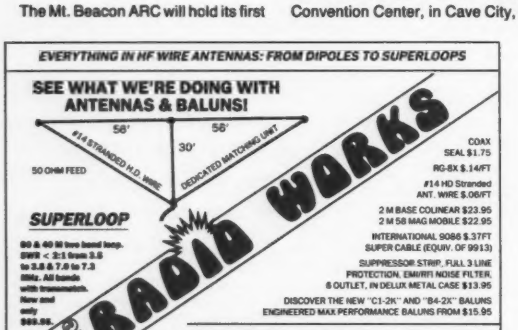
The Midland ARC will hold its annual St. Patrick's Swapfest on March 14, from 10 a.m. to 5 p.m., and March 15, from 8 a.m. to 2:30 p.m., at the Midland County Exhibit Building, located east of Midland on the north side of Highway 80. Pre-registration is $5, $6 at the door. Tables are $6 each. VE tests for all categories given. For further information and reservations, please write to Midland ARC, PO Box 4401, Midland TX 79704.

PUTNAM CT
MAR 15

The Eastern Connecticut Amateur Association will hold its 13th annual flea market on March 15 at the Elks Hall on Edmund Street, Putnam, Connecticut, just off Exit 96 of Interstate 395. Admission is $2, tables $7 each. Talk-in on 147.225/.825 and 146.52. For further information, contact either Don Amirault K1APE, 66 Labonte Road, RR 1 Box 310, Thompson CT 06277; (203)-923-2727 or Dick Spahl K1SYI, Lake Parkway, Webster MA 01570; (617)-943-4420 after 7 p.m.

STERLING IL
MAR 15

The Sterling-Rock Falls ARS will hold its 27th annual hamfest at the Sterling High School Fieldhouse, 1608 4th Avenue. Doors will open at 7:30 a.m. Tickets $3 in advance, $4 at the door. Commercial tables and tables requiring electricity $5, others $3. Talk-in on 146.25/.85. For more information, tables, or tickets, contact Sue Peters, PO Box 521, Sterling IL 61081; (815)-625-9262.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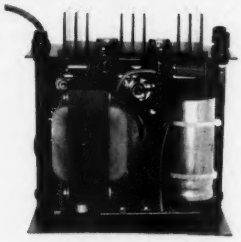

INSIDE VIEW – RS-12A

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MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

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• SEPARATE VOLT & AMP METERS				
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt (lbs)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

RS-M SERIES

MODEL RS-35M

• Switchable volt and Amp meter

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12M	9	12	4½ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10½	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46

VS-M SERIES

MODEL VS-20M

- Seperate Volt and Amp Meters
- Output Voltage adjustable from 2-15 volts
- Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Continous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7S	5	7	4 x 7½ x 10¾	10
RS-10S	7.5	10	4 x 7½ x 10¾	12
RS-10L(For LTR)	7.5	10	4 × 9 × 13	13
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18

WEST HARTFORD CT
MAR 15

The Insurance City Repeater Club will hold its annual Computer/Amateur Radio Flea Market on March 15, from 9 a.m. to 2 p.m., at the American School for the Deaf in West Hartford, Connecticut. Admission is $2, tables $10. Talk-in on 146.88 and 147.15. Contact Chuck Motes K1DFS, 22 Woodside Lane, Plainville CT 06062.

CHICAGO SEMINARS
MAR 15–16

The Chicago ARC will hold a continuous seminar entitled "Introduction to Amateur Radio" on March 15, from 12 noon till 5 p.m., at the North Park Village, Community Room, 5801 N. Pulaski Road, Chicago. Live operation of transmitting and receiving equipment will be demonstrated. ARRL film "The World of Amateur Radio" will be shown. The amateur radio "Novice Class" license seminar will be held on March 16 at 7:30 p.m. at the same address in the "J" building. For more information, call (312)-545-3622.

MARSHALL MI
MAR 21

The Southern Michigan ARS and the Marshall High School Photo Electronics Club will sponsor the 26th annual Michigan Crossroads Hamfest on March 21, from 8 a.m. to 3 p.m., at Marshall High School. Directions: I-69 to I-94, then east to Exit 110 (old U.S. 27), then south and east to school. Tickets $2 in advance (SASE) or $3 at the door. Table reservations 50¢ per foot (minimum of four feet). Send SASE to SMARS, PO Box 934, Battle Creek MI 49016, or call Wes Chaney N8BDM at (616)-979-3433. Talk-in on 146.67, 146.52, or 223.94. Exams given at 9:30 a.m.; send Form 610, SASE, and $4.25 (payable to ARRL/VEC) to License Exam, PO Box 2, Pleasant Lake MI 49272.

FORT WALTON BEACH FL
MAR 21–22

The Playground ARC will sponsor its 17th annual North Florida Ham/Swapfest on March 21, from 8 a.m. to 4 p.m., and March 22, from 8 a.m. to 3 p.m., at the Shrine Fairgrounds on Lewis Turner Blvd. in north Fort Walton Beach. FCC exams Saturday only. Talk-in on 146.19/.79 and .52. For more information, write to PARC Ham/Swapfest, PO Box 873, Fort Walton Beach FL 32549.

TRENTON NJ
MAR 22

The Delaware Valley RA will sponsor HAMCOMP '87, its 15th annual flea market of amateur radio and computer equipment on March 22, from 8 a.m. to 2 p.m., at the New Jersey National Guard 112th Field Artillery Armory, Eggerts Crossing Road, Lawrence Township, approximately two miles north of the I-95, Rte. 206 interchange. Admission is $3 in advance, $4 at the door. Indoor selling spaces are $10 (wall space) or $7; outdoor spaces are $6. No tables provided. Talk-in on 146.07/.67. For more information and space reservations, write to HAMCOMP '87, c/o KB2ZY, Box 441B, R.D. #1, Stockton NJ 08559 (SASE please).

MAUMEE OH
MAR 22

The Toledo Mobile Radio Association, Inc. will hold its 32nd annual Hamfest and Computer Show on March 22, from 8 a.m. to 5 p.m., at the Lucas County Recreation Center, Key Street, Maumee, Ohio. Tickets cost $2.50 in advance or $3 at the door. Tables are available. For tickets and table information, please send an SASE to TMRA, Inc., Robert Hanna K8ADK, 2154 Circular, Toledo OH 43614.

JEFFERSON WI
MAR 22

The Tri-County ARC (W9MQB) will hold its annual hamfest on March 22, from 8 a.m. to 3 p.m., at the Jefferson County Fairgrounds, Jefferson, Wisconsin. Tickets are $2.50 in advance, $3 at the door. Tables are $3 in advance, $4 at the door. Amateur exams given by the Milwaukee Volunteer Core Group. Talk-in on 144.89/145.49 or 146.52. For more information, tickets, or tables, send an SASE to Bob Barker K9RIJ, 724 Burdick, Milton WI 53563.

MADISON OH
MAR 22

The 9th annual Lake County ARA Hamfest will be held on March 22, from 8 a.m. to 4 p.m., at Madison High School, Burns Road at Middle Ridge Road, Madison, Ohio. Admission is $4 at the gate, $3 in advance (send SASE before March 9). Tables: 6-foot, $5; 8-foot, $6.50. Exams given, walk-ins limited (send Form 610, license, and check for $4.35 made out to ARRL/VEC by March 15). Talk-in on 147.81/.21. For further details, call (216)-953-9784 in Cleveland or write to Lake County Hamfest Committee, 7803 Skylineview Drive, Mentor OH 44060.

CHERRY BLOSSOM FESTIVAL
MAR 28

The Macon ARC will operate W4BKM from 1500 UTC until 2100 UTC on March 28 to commemorate the Cherry Blossom Festival. Operation will be phone 14.237 and CW 7.137. For a Cherry Blossom Certificate, send a large SASE to Macon ARC, PO Box 4862, Macon GA 31208-4862.

EGG HARBOR CITY NJ
MAR 28

Shore Points ARC invites everyone to Springfest '87 on March 28, from 9 a.m. to 2 p.m., at the Atlantic County 4-H Center, Rte. 50, Egg Harbor City, New Jersey (approximately 15 miles west of Atlantic City). Tailgating available, weather permitting. Limited ac in

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- ★ Measures only 1¼ x 3 x 5½ inches. ★ Decodes all 16 digits.

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The 1987 Callbook Supplement is a new idea in Callbook updates; it lists the activity in both the North American and International Callbooks. Published June 1, 1987, this Supplement will include all the new licenses, address changes, and call sign changes for the preceding 6 months.

Publication date for the 1987 Callbooks is December 1, 1986. See your dealer or order now directly from the publisher.

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indoor space. Sellers $5 per space (bring own table); buyers, $3. Talk-in on 146.985 and .52. For more information, write to SPARC, PO Box 142, Absecon NJ 08201.

UPPER SADDLE RIVER NJ
MAR 28

The Chestnut Ridge RC will sponsor its 10th annual ham radio flea market on March 28 at the Education Building, Saddle River Reformed Church, East Saddle River Road and Weiss Road, Upper Saddle River, New Jersey. $1 admission fee. $10 for the first table, $5 each additional table. Tailgating, $5. For more information, call Jack Meagher W2EHD at (201)-768-8360.

LAWTON OK
MAR 28

The Lawton-Ft. Sill ARC will hold its 40th annual old-fashioned one-day swapfest on March 28, from 8 a.m. to 6 p.m., at the County Fairgrounds in Lawton, Oklahoma. Admission is $2 at the door. Tailgating $3, tables $5. No pre-registration. For more information, write to Don K5CKQ, 912 Bell Street, Lawton OK 73507.

BALTIMORE MD
MAR 28–29

The Baltimore ARC, Inc., will present the 1987 Greater Baltimore Hamboree and Computerfest on March 28th and 29th at the Maryland State Fairgrounds Exhibition Complex in Timonium, Maryland (east of I-83 Exit 17, three miles north of I-695, just north of Baltimore). The Hamboree and Computerfest will be open from 8 a.m. to 5 p.m. on Saturday and from 8 a.m. to 4 p.m. on Sunday. Admission is $4 for one day or $6 for both days, children under 12 free. For additional information and display space reservations, contact GBH&C, PO Box 95, Timonium MD 21093-0095; (301)-HAM-FEST.

ELIZABETHTOWN KY
MAR 28–29

The Lincoln Trail ARC will hold a hamfest on March 28 and 29 at the Pritchard Community Center, Elizabethtown, Kentucky. Admission is $5 in advance, $6 at the door. Tables (must be reserved): $10 for one day, $15 for both days. Flea market space: $5 for one day, $8 for both days, plus admission ticket. Talk-in on 146.52 or 146.38/.98. For advance tickets and set-up reservations, contact Hubert Hensley WD4GDA, PO Box 342, Vine Grove KY 40175; (502)-877-2234.

GRAYSLAKE IL
MAR 29

The Libertyville and Mundelein ARS will sponsor Lamarsfest 1987 on March 29, from 8 a.m. to 2 p.m., at Lake County Fairgrounds, Grayslake, Illinois. Directions: I-294, Exit Rte. 120 West, right on Rte. 45; fairgrounds two blocks on the left. Admission is $2 in advance (deadline by mail is 3/20) or $3 at the door. Exams given. Talk-in on 147.63/.03 or 146.52. For more information or reservations, contact Lamars, c/o Marc Abramson, PO Box 751, Libertyville IL 60048; (312)-255-0642, 8–10 p.m.

WALLA WALLA WA
MAR 29

The Walla Walla Valley ARC will hold its annual indoor Swap-Meet on March 29, from 8 a.m. to 5 p.m., at the Oregon Community Building in Milton-Freewater. Tables will be $5 and admission is free. Talk-in on 147.88/.28. For more information, contact Bernie Frazier WA7CBX, 610 S. 1st Avenue, Walla Walla WA 99362; (509)-529-9879.

AURORA CO
MAR 29

The annual ARA Swapfest will be held on March 29, from 8 a.m. to 3 p.m., at the Colorado National Guard Armory, 55 S. Potomac, Aurora, Colorado. Talk-in on 147.75/.15. For more information, call Linc Haymaker at (303)-680-0349.

WILLINGBORO NJ
APR 5

The Willingboro Repeater Group will hold its annual hamfest on April 5, from 8 a.m. to 2 p.m., at Holiday Lakes, Rte. 130 and Creek Road, Willingboro, New Jersey. Admission is $3 at the door or $2.50 in advance, XYLs and children under 16 free. Table space: $5 per 8-foot table. Tailgaters must purchase an admission ticket, outdoor selling only. Talk-in on 146.925 or 146.52. For further information, write to Willingboro Area Repeater Group, PO Box 472, Willingboro NJ 08046, or call Jack K2KLM at (609)-877-5249 after 6 p.m.

FRAMINGHAM MA
APR 5

The Framingham ARA will hold its annual spring flea market and exams on April 5, beginning at 10 a.m., at the Framingham Civic League Bldg., 214 Concord Street (Rte. 126), in downtown Framingham, Massachusetts. Admission is $2 and tables are $10 (includes one free admission). Pre-registration is required for tables and exams. Talk-in on .75/.15. To reserve tables, contact Jon Weiner K1VVC, 52 Overlook Drive, Framingham MA 01701; (617)-877-7166. To register for license exams, send completed Form 610, copy of ham license, and check for $4.25 payable to ARRL/VEC to FARA, PO Box 3005, Framingham MA 01701. Walk-in exams given on a space-available basis.

MADISON WI
APR 5

The Madison Area Repeater Association, Inc., will hold its 15th annual Madison Swapfest on April 5, beginning at 8 a.m., at the Dane County Exposition Center Forum Building in Madison, Wisconsin. Admission is $2.50 in advance and $3 at the door. Children 12 and under are admitted free. Tables are $5 each in advance and $6 at the door, plus admission. Reserve by March 31. Talk-in on 146.16/.76. For admission tickets, table reservations, or information on commercial exhibit space, contact MARA, PO Box 3403, Madison WI 53704; (608)-274-5153.

SUBMARINE SERVICE ANNIVERSARY
APR 11–12

The Olympia RAC will celebrate the anniversary of the United States Submarine Service by operating station WA3BAT from the U.S.S. Becuna, a World War II submarine, and the U.S.S. Olympia, flagship of Admiral Dewey in 1898. Transmissions can be heard beginning 1300 UTC on April 11 until 2000 UTC on April 12. CW frequencies will be 3.590, 7.050, 14.050, 21.090, and 28.150. Phone frequencies will be 3.890, 7.240, 21.360, and 28.600 (all frequencies within 10 kHz). Two-meter and Novice operation are also planned. For a certificate and additional information, send business-sized SASE (U.S.) or one IRC (foreign) to Olympia Radio Amateur Club, PO Box 928, Philadelphia PA 19105.

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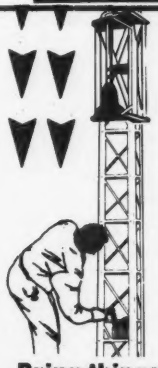

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Following the old "KISS" principle (Keep It Simple, Stupid), I recommend this simple "three-piece CPO" (Fig. 1) to budding Novices. The piezo buzzer is available at most hamfests or from any Radio Shack store.

Skip Westrich WB8OWM
Canton OH

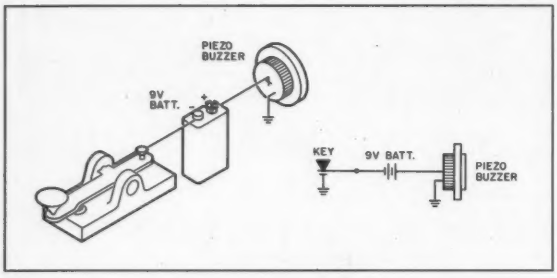

Fig. 1. Three-piece CPO.

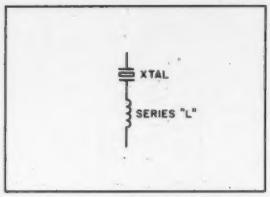

Fig. 2. Crystal frequency shift.

One way of moving a crystal's frequency, besides padding it with capacity, is to insert series inductance (Fig. 2). Depending on the crystal's characteristics, frequency changes of about 1,000 ppm may be obtained with 20 to 30 uH.

Bob Raker WB8ZFF
Cincinnati OH

The idea of a filament choke is isolation from ground. This allows power to be fed to the cathode. For practical purposes, about 500 to 600 Ohms of isolation is sufficient. To construct the choke, twist together two 6–8-inch lengths of #12 or #14 insulated wire. Then take 35 ferrite beads made from #73 material and slip them over the twisted pair of wires. Secure the beads with electrical tape and connect one end to the filament of the tube and the other to the filament voltage. The choke should give about 750 Ohms of isolation.

Matt Erickson WA4WAX
DeLand FL

Being dissatisfied with low-duty-cycle (one minute on/twenty minutes to cool) bulk-tape/cartridge erasers, I built one better suited for my purposes (Fig. 5). I took an old power-supply filter choke from a TV set, removed the "I" section of the laminations, and taped it up for mechanical and electrical security. It works perfectly without quickly overheating. The one I used shows a dc resistance of 40 Ohms. Exact impedance is not critical so long as it offers enough load to the line that it doesn't draw excessive current, which is the weakness of the commercial one I described.

Wm. Bruce Cameron WA4UZM
Temple Terrace FL

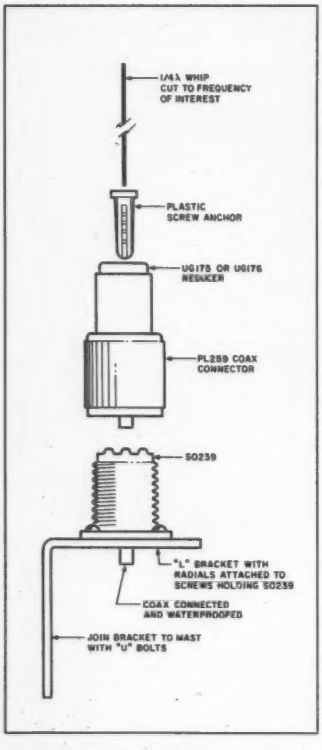
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Fig. 3. Simple construction of a VHF whip.

A simple solution for insulating a vertical radiator is shown in Fig. 3. A plastic screw anchor available from a local hardware store is inserted into the reducer. These anchors (used to hold screws in plaster walls, cement, etc.) come in various sizes that allow for different diameters of whip. Fig. 4 shows the radial construction. The radials should be bent at 45° angles.

Richard E. Duell W9LSD
Cocoa FL

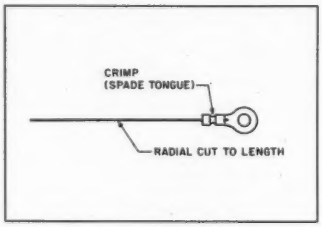

Fig. 4. Radial construction.

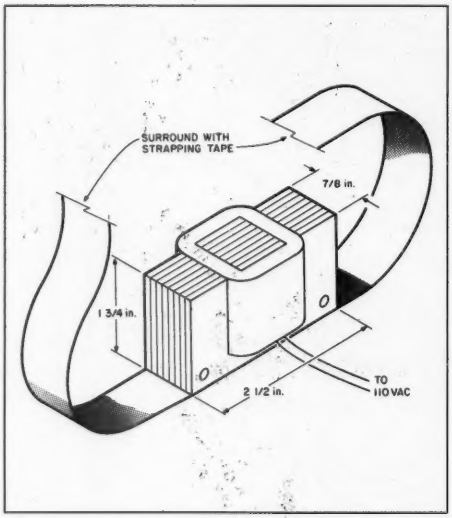

Fig. 5. Better bulk eraser.

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Carl S. Zelich AA4MI
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NEVER SAY DIE

from page 12

come close to living up to your responsibility. That's a prostitution of everything we stand for—a completely dishonorable thing to do.

Oh, I suppose we should make allowances during contests, since winning a contest is far more important than honor or country. These things have to be kept in perspective. Winning, as they say, isn't important, it's everything—which probably explains the pervasive cheating in our contests—over power, imaginary contacts in the logs, two-meter cheat-nets, and so on. Is it even possible for an honest ham to win a major contest? I suppose these are things better left unwritten—unthought about. I know they're things I'll never bring up in my editorials.

Okay—you have your instructions. Get your rig fired up, aim your beam at Russia, and start making good friends with every Russian op you can find. You've got years of bad operating on your part to correct. Verging on illegal, I'd say. Maybe verging over it. Repent!

And hey, let me know how you make out. Yes, I'll be monitoring you—listening—making a note of your call if I hear you just swapping signal reports. Yes, if you fink out, I'm liable to expose your perfidy right here in *73* so everyone will know you for the wimp you are. Beware my wrath.

A note to any ham who is dense enough to take the above seriously—go soak your head. Lordy! I don't know what things are coming to—gripes when I give women hell for being in a minority on our ham bands—gripes when I beef about that awful operator in Watts—which apparently makes me a bigot—and you should see the torches light up when I even hint the League could be improved. There's a big need for head soaking.

HOW TO CHEAT

My oh my, the letters I've been getting beefing that amateur radio is boring these days—that contacts aren't what they used to be—how amateur radio has gone downhill. Sure it has, but is writing to me the answer? Perhaps, in this case, it may have helped.

Yes, I agree with you that contacts sure can be boring. All one has to do is start tuning the bands and listen to the cookie-cutter QSOs which clutter things so badly it's difficult to find a frequency to cut cookies on.

Can hamming be made more fun? Now what in the world is Wayne going to come up with to solve this problem—and solve it, I can. There is a secret to interesting contacts, one obviously lost in the sands of time, but of which I am privy and will reveal. Now all you have to do is make copies of this editorial and send it to the boring old fa...er...chaps you've contacted recently...right?

The first step in solving this age-old ham misery is to recognize that it is just that, a problem that has been with us for all ham recorded history. Hells bells, Hiram Maxim used to bitch about this in his early 30s "The Old Man" editorials, so the problem has been around even longer than Wayne Green.

I think the problem is more noticeable these days because we're having so few new hams—hams who haven't yet been worn into the same old mold by virtue of thousands of cookie-cutter contacts. In case you missed the bad news, the number of new hams has been dropping—seriously dropping. Yes, yes, I've read the same Pollyanna crap you have about us having more hams—but you can only come up with those silly numbers if you don't count those full pages of Silent Keys in *QST*. The fact is that the FCC doesn't know within about 15% how many of us are actually still alive. And I'm not even discussing the brain-dead I hear on some repeaters.

Okay. The first step toward finding more interesting contacts on the ham bands is to recognize the power of what is called in psychological circles "projection." This is the mechanism which causes all of us to see our own problems reflected in others around us. Yes, you've got it. The problem is not them, it's us. Or, as Pogo said, "We've met the enemy and the enemy is us." Or something along that line.

After you get over being angry with me for fingering you as the problem perhaps we can get busy solving it. Remember, until you're able to state a problem, the resolution will be most difficult. And once you've stated the problem, the solution is generally obvious. Hey, I don't mean to be abusive, but isn't it time we called a spade a shovel and started digging for the solution?

What I'm suggesting is some serious thought about your on-the-air performance. Are you radiologically impotent? Remember, to consummate intercourse (talking, I mean—oh, what a filthy mind you have—I'm absolutely disgusted with you for thinking impure thoughts like that) you have to excite your partner—the person with whom you are having a QSO. It may come as a rude shock to you if I reveal some long hidden ham lore...a recitation of the usual baloney...your rig, signal report, weather, location, antenna, serial number of your mike, ad nauseum...is not going to generate much heat—much enthusiasm.

"Now and then I strike pay dirt and have a whale of a contact."

Hey, have you ever had the guts to record your transmissions and listen to them later? No, of course you haven't. What could be more boring, right? Well, that's what I'm saying. Your transmissions should be so much fun and so exciting that you sit there and have a great time listening to them over again later.

Let me ask a question. Outside of hams, do you have any friends at all? Okay, you have friends. Now think hard, what do you talk with them about? Do you ever tell any stories of things that have happened to you? Ever talk about things you've done recently? Unless you're a worse turkey than I think, you actually are capable of talking about something which will interest others. Now, how are you going to get some of that into your ham contacts?

One way is to make some notes on things to talk about. Sure, it's a lot more difficult to maintain a conversation with someone when you don't get the usual feedback—nods, uh-huhs, yeahs, and such. Well, that's your fault for not developing duplex ham contacts instead of the silly one-way stuff we've been stuck with all these years.

Real old-timers will remember when we did have duplex—and they'll tell you what fun we used to have with it. I got a note from Roy Neal K6DUE at Ham/West saying an old friend of mine, Walt Zuckerman WA6BMG, who used to be W2LBF in Brooklyn when he got his ticket around 1938, passed along his regards, wondering if I remembered him. You bet! When I was an SWL (a polite name for a bootlegger in those days) I used to visit Walt, who lived about four blocks away on Ocean Avenue, and sit with him and talk on 160 meters.

Most of the 160m gang had 6L6 crystal oscillators modulated by a second 6L6, running maybe 10 Watts or so. By lining up stations on the high and low end of the band, we were able to all rebroadcast each other so six or more of us could all sit and talk in a round table—all hearing each other just as we would if we were in the same room. That was fun none of the old-timers will ever forget.

This fun came to an end when the FCC made a rule prohibiting the use of the carrier for purposes other than communications. They didn't rule out duplex on purpose, it just got blown away when they were stopping the few jerks who would broadcast phonograph records for hours. Yes, we had an ample supply of jerks then, too.

Actually, a strict interpretation of the rule would have allowed duplex, because someone was listening to every carrier and every carrier was thus being used for communications. Years later I worked this out when I had fun putting together two-band contacts between 75m and 20m, broadcasting on both bands at once, repeating 20m stations from Africa or Australia for our 75m round table to contact. I checked with the FCC at the time and got the okay on that. That didn't stop one officious FCC monitor from sending me a pink card, but it did help get him off my back when I sent him a copy of Washington's okay for what I was doing.

Duplex beats the heck out of simplex, so we should have developed some practical duplex sys-

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tems years ago. This is just another case of our getting into a rut and not even knowing it. When we started developing our repeater systems we had an ideal opportunity to make them duplex. Another missed opportunity.

Getting back to making your contacts more interesting, since we're stuck with stupid simplex you've got to make the best of it. Either that or else start working on some practical duplex systems which I can promote in *73*. I'm game if you aren't so encrusted with tradition that you are frozen.

Know any jokes? Good grief, you're hearing 'em every day at work, from friends, and on TV. If you don't have a good collection of jokes by now it's because you aren't even trying to get along with people. The next time you hear some jokes, make a note of them and work them into your conversations with your friends and family. Oh, you say you don't talk with your family—hmph, that's not a big surprise. Okay, then at least try out your jokes on friends and get used to telling 'em. You can't tell jokes well without practice any more than you can roller skate without practice.

No, I'm not saying you have to go on the air as a stand-up (well, sitting down) comedian. But I am saying that the more you can work some jokes into your contacts, the more fun your contactees are going to have—and the more fun you'll have. You'll have fun for two reasons. First, you're going to start hearing something you haven't heard in years—honest compliments on how enjoyable the QSO was. Second, by being entertaining yourself you'll spark the other person to be more fun. Can you really respond to an interesting anecdote about hunting or something with your usual dumb list of the ham gear you're using, your name and location. . . over?

Think of some interesting things you've talked about with friends and make a note of them to have at hand when you get on the air. It's difficult to think (at first) when you are making one-way transmissions and aren't getting visual and verbal cues, so you need to have some operating aids at hand to help you bring out The New You.

You really want to drive someone bonkers in a QSO? I often use this fiendish ploy and with great success. What you do is flatly refuse to tell the person you're talking with what rig or antenna you are using. This breaking of the usual QSO pattern drives some chaps right up the wall. They will actually plead and beg to find out what rig you're using as you sit there smugly chuckling.

What darned business is it of theirs what rig you're using? They're hearing you, so what more do they need to know? Have you ever tried NOT giving a signal report? I often will tell a chap he's nice and loud and leave it at that. Some even get abusive, demanding a number to put in their log. Holy Moly!

Let's see if you can actually get through an entire contact with someone without discussing your equipment or the weather. Are you up to such a herculean task? Sure, it's going to take some work getting ready for such a monumental contact. You're going to need some cheat notes at hand and some practice with a few jokes. You probably won't make it the first few times you try a non-routine QSO. Stick to it. You might get out your tape recorder and analyze where you fall apart.

Now, I'm going to be listening for you on the air. You'll hear me on 20m. If you tell me your rig it's two points off. Four for the antenna. Twenty points if you mention your mike. Five off for weather. Two if you give me a signal report with numbers. Twenty if you push me to give you numbers—then I'll be listening for you on Channel 19, Good Buddy.

Now you have the message. Yes, our bands sure are packed thick with routine, boring contacts. This will change as soon as you shape up and get to be more fun to talk to. No, not every turkey out there is going to shape up, but enough will to make hamming a lot more fun for you. . . for all of us.

Oh, I have one more secret for you. I'll sure be in the dog house for this one, but I've got everyone all upset with me anyway for calling things as I see 'em, so losing a few more friends is (sigh) the price I pay. Let me put this in the form of a question. Have you ever wondered why so many hams have gotten all excited about RTTY in past years? Or why packet radio has taken off like a rocket? No, pal, it isn't because computers are involved. It's because the contacts via RTTY and packet are head and shoulders above what we're all hearing elsewhere. Sure, the difficulty (which isn't much) of getting on RTTY or packet is a filter which removes a high percentage of our ham dross. Now don't you dare mention I wrote anything about this or I'll be in hot water with the packet crowd.

If any of you have some surprising success stories resulting from your applying my suggestions for pepping up your contacts, please drop me a note. Don't get mad if I don't answer personally. But know that I do read every letter I get—and probably answer 75% of 'em. I'm going to have to back off on answers so I can get other things done. I want to know if you notice any improvement as a result of this. Hamming will remain boring for you only as long as you are boring to others.

There are plenty of interesting things to talk about, once you get the hang of it. I've found hams interested in Hopper (the painter), and we've shared our excitement in seeing the Hopper paintings duplicated in Steve Martin's movie, "Pennies From Heaven." Or perhaps we get to talking about computers—or cameras. All you have to do to make a QSO intensely interesting to the other person is ask a question about something the person knows about. You then sit back. You'll find the more you can get the other person to talk, the more exciting (s)he will find the QSO. So listen for clues—and throw in plenty of your own.

I often drop hints about my interest in cars, horses, dogs, travel, skin diving, skiing, cooking, and so on. Oh, I don't recite a list of my interests, rather I mention a few in passing and wait to see if the bait is taken. More often than not the other chap is so used to not hearing anything that he isn't really listening, so I get the usual minus fifty point QSO. Now and then I strike pay dirt and have a whale of a contact. It happens often enough to keep me coming back for more.

Let's see, is there anything interesting about your work I might like to hear about? A trip you've made? Some ham exploit—like a new rare one? Did you catch an aurora opening on two meters and work a bunch? Maybe you've caught some unusual skip on six? Sure, it's self-serving, but you could do worse than read *73* and comment on the interesting articles (if you find any)—or the lack of them, if being a curmudgeon is your bag.

Are you reading the International News in *73*? We're not putting it in just to fill space. You'll find some great stuff there. And if you work DX, you'll have a good start on a good contact when you show you're interested enough in a country to have read about it. If you're not working DX, shame all over you. That's one of the big excitements we have in amateur radio. Yes, I know all about the crummy sunspots; they just make it a bit more difficult to work DX, they don't stop it. And you don't need a twelve-element beam to get out—or even a kilowatt. With a barefoot rig, a dipole, and some persistence you can work 'em. No, you won't work 392 countries, but you'll have plenty of fun QSOs.

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A QSL card might even help you make a second contact with the person, allowing you to start building a relationship. If you have a computer you can keep track of the other chap's interests. I used to keep a 3 x 5 card file of my contacts and it worked wonders. I have virtually no memory at all—a real head start toward Alzheimer's—so the card index was perfect for me. Oh yes, Bill, the retired brakeman who's interested in orchids. A computer is better these days if it has a hard disk to provide you the memory you need. They aren't all that expensive, so don't whimper about not being able to afford one. Besides, surmounting the frustration of conquering a new computer will give you oodles to talk about on the air.

Now get busy.

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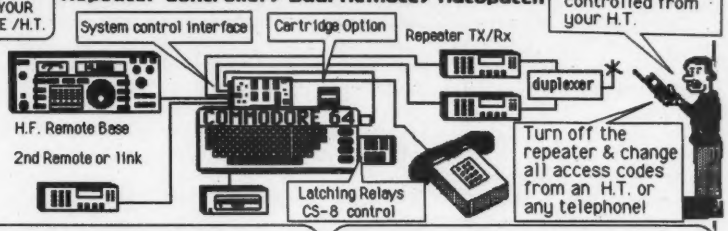
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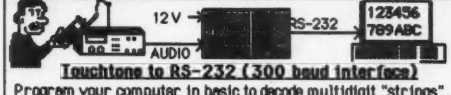

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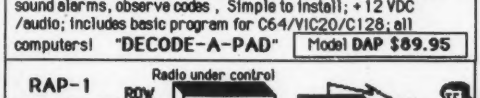

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imagine. Let's see what we come up with.

The first hurdle is getting kids to even come to the club to see what it's about. We're looking for kids who are around 12 years old—that's when the ham hobby hits the hardest and the most permanently. A 12-year-old kid is going to have parents who are around 35, which means 35 to them is going to be "old." The average ham, now 56, is the age of their grandfather, not their father. Talk about a generation gap!

On the positive side, you'll probably find a surprising percentage of your ham club members have children or grandchildren (and probably great-grandchildren) in the 10–15-year range we're looking for. Fine—get them to come with gramps to a meeting. Club meeting posters in the local schools may help bring out a few volunteers, too. Check with Boy Scout and 4-H Clubs in your area, both prime sources of potential hams.

News flash: The club meeting darned well better be interesting. Kids have little tolerance for business meetings or trying to deal with a bunch of grandfathers. And no, a code class isn't going to be greeted with open arms. So what can you do to get them to keep coming back?

How about taking off your Pooh-Bah mask and talking with them just as if they were actual people. Find out what they know about amateur radio so far. Find out what aspects, if any, interest them. Have they ever visited a ham station and talked over the air? Do they understand about repeaters? Packet? Give them attention—make them comfortable—show an interest in them personally.

I've visited many clubs where I've seen the old-timers ignoring the youngsters—just talking with their old friends. Then they badmouth the kids because they drop out after a couple meetings.

I knew a ham who had it down cold. He could stop newcomers dead in their tracks and put them off ham radio for life. Sure, kids—even the dumbest of them—know they have to learn the damned code. Well, this joker would invite youngsters over to his shack, make two or three high-speed CW contacts, then wake up the sleeping kids and thank them for coming. That was the last anyone ever saw of 'em.

You'll find that most kids are fairly used to using their voice to communicate, so demonstrating a bug or even a computer keyboard may not be the best way to reach their innocent hearts. Try some DX voice contacts. Don't try to impress them with a crummy signal report swap with a rare country. Just stick to something easy where you can talk without too much interference and allow them to get on the mike.

"Work your way through a Novice license study manual with the kids—if you have anyone in the club who actually passed his license exam honestly."

If you start getting your club involved in some fun projects, that'll help kindle kid interest. Your club might provide communications for a car rally—a marathon—a sporting event—act as runners for a charity telethon. Not only will the kids do most of the actual leg work involved, they'll love it and be back for more.

How about antenna and tower-raising parties? Have you thought of organizing club trips to an observatory, a nearby FAA center, a local electronic plant? Club activities such as picnics, flea markets, auctions, and hamfests all need lots of energetic youngster help.

Once you have your junior auxiliary going, you'll want to get them started on their ham tickets. Yes, they have to learn the stupid code, but you'll find them much more enthused over learning the basics of radio and electronic theory and learning the rules and regulations.

Can you get them interested in trying a simple building project? Perhaps you can find one in *73* where there is an available parts kit which they'll enjoy. Getting the right parts is a bear today, so we try to help by organizing parts kits for most of the easier *73* construction projects.

Demonstrations at club meetings of new ham technologies such as packet radio, OSCAR contacts, RTTY, SSTV, and so on will pack 'em in. It isn't going to hurt with the older club members either—even the oldest hams eventually get bored with long business meetings and politics.

As I've pointed out before, club meetings are show biz, so get the business done with the executive committee. Old fa. . .timers will love being made directors of the club, so let them have business meetings to their poor old hearts' delight and don't drive the kids away from the regular meetings with boring business.

Does your club have a repeater? You might want to get *Westlink* every week and broadcast the news—with a check-in for members afterwards. The *W5YI Report* is also interesting. Subscribe to both.

How about a half-hour pre-club meeting for license study discussions? Work your way through a Novice license study manual with them—if you have anyone in the club who actually passed his license exam honestly. Of course if everyone Bashed their way into the hobby you may have a problem finding someone with an understanding of electronic fundamentals. I did an audio tape Novice theory series years ago—sold well. Maybe I should sit down in front of a video camera and do it over again.

I've seen some recent attempts at video instruction, but they were incredible bores. You need someone with some fire—enthusiasm—and no fear of the camera. I eat TV cameras for lunch—and the bigger the group I'm addressing, the more fun it is for me. Learning must be fun if it's going to work, so find someone who knows his stuff and can make it fun.

Getting kids interested in amateur radio enough to get their Novice license is the first step. Once they are started, it's up to your club to goad them into getting on the air and upgrading to a General. Don't let 'em get stuck in that ham backwater, the Tech license.

Help 'em put up antennas. Make skeds with them. We lose most kids even before they become Novices, but we've been losing a hefty percentage of our Novices through plain neglect.

Okay, there are some of the basics. Now I want to get some letters from you telling me what you've done to interest youngsters in coming to your club meetings. Let me know what has worked for you.■

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CALLSIGNS

All this talk about callsigns really has my adrenaline flowing.

At the time I'm writing this column, the FCC was thinking of turning its call assignment mechanism over to a private organization (presumably the ARRL). When this happens (if it hasn't already occurred by the time you read this), we will all be able, for a fee, to choose our own callsigns. Whoopee!

Few of us care what our social security number is or what's imprinted on our Visas or Mastercards. We hams, however, have a never-ending concern about our callsigns. It's our on-air persona. I mean, who wants to enter a pileup with a call like KB7LID? Not me, although I can think of some people I'd like to give such a call to.

I would sure like to get rid of KI2U, and I sorely regret the day I traded in WB2IBE. Do you know how many people—hams included—have looked at my callsign badge at a flea market and called me K-12-U? Or K1ZU? Too many.

I can well remember the day I got my first callsign. Unlike most hams, I didn't find out from the FCC. No, that would have been too simple. For me, the bearer of the glad tidings was The Little Print Shop, in Austin, Texas, QSL card maker extraordinaire.

I don't know how the LPS does it, but I believe they can find out your Novice callsign even before you take the test. I think about a third of the hams in America found out they passed their Novice test from those Texas pasteboard makers. In my case, the LPS performed a real public service, since the FCC had royally screwed up my license. I didn't receive my official ticket until some six weeks after my LPS "notification." It didn't really make a big difference, though. I just pasted one of those sample LPS QSLs on my shack's wall and began pounding brass. My brother put a gold star on the card to make it official.

Remember the days when Extras could request a specific 1-by-2 call? Back in 1977, WA2MJK and I tried to upgrade to Extra just so we could request K2VD and W2VD. Socially contagious callsigns. We failed, as Mitchell K. Collinsworth and Michael Ross—the current holders of those calls—can attest.

"I mean, who wants to enter a pileup with a call like KB7LID?"

I'm not sure what call I would request if given the opportunity. I know it couldn't be anything off-color, since the ARRL just wouldn't stand for that. A FUN suffix would be nice, but people might expect every QSO to be a "laff riot." I don't know if I could live up to the promise.

On the other hand, I could always get WB2IBE back. The IBE suffix had a nice ring on CW: di dit, dah di di dit, dit. But then, I'm not on CW much these days.

Or, here's an idea that will drive your best ham friend crazy: Get his old callsign. Maybe I'll snag WA2MJK's Novice call, WN2ZFF. I wonder what AF2M would think if I took his old call, WB2MMR. Heh-heh. Hey, don't anybody take WB2IBE while I'm still thinking about it, okay?

Along the same line, I wonder if they would let me retrieve an "infamous" callsign from the past, like a call once held by Crazy Pat Sherrill or Kool-Aid Jim Jones. You have to admit, with a call once owned by fellas like that, you'll always have a story to open a QSO with.

At this point, perhaps I should ask you, my radio audience, to suggest a replacement call for KI2U. Okay, I'll do it. Do you have a callsign idea for me? (Please no W2FAT suggestions; I'm a bit sensitive about that.) If you have an idea, send it to me at the address at the top of this column, and I'll give your call proposal due consideration.

Hey, there's an idea! K6DUE. Nah, it's been taken.■

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"What's in it for me?" comes the cry from our faithful readers. Besides the knowledge that you're helping us find out what you like (and don't like), we'll draw one Feedback card each month and award the lucky winner a free one-year subscription (or extension) to *73*.

To save some money on stamps, why not fill out the Reader Service card, the Product Report card, and the Feedback card and put them in an envelope. Toss in a damning or praising letter to the editor while you're at it. You can also enter your QSL in our QSL of the Month contest. All for the low, low price of 22 cents!

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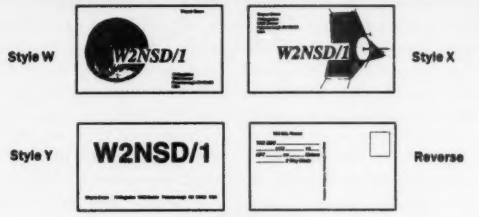

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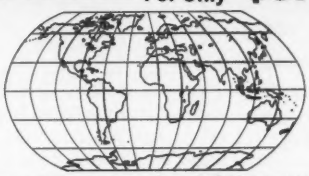

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LINEAR TRANSVERTERS

This month I'd like to touch on a previous topic that might benefit from further discussion. This topic is the theory and operation of linear transverters, since a great deal of misconceptions exist regarding these devices and how they work. I've also seen many examples of improper use and subsequent damage of transverters, largely due to these same misconceptions.

Let's get down to basics: A linear transverter is probably the simplest way to get a signal on the VHF and UHF bands. By definition, a linear transverter is a transmit and receive converter with all appropriate switching contained in one circuit, capable of upconverting rf signals from and downconverting to an intermediate frequency in a linear fashion. Seems easy enough!

Fig. 1 illustrates the typical block diagram of a transverter. The circuit scheme is quite simple, using a local oscillator (LO), transmit mixer, transmit rf amplifier(s), receive mixer, and receive rf amplifier. Some sort of transceive switching is usually employed on board at both the intermediate frequency and the desired conversion frequency.

If you wanted to build the simplest transverter possible, all you'd really need would be the LO, the transmit mixer, and the receive mixer. This would encompass three active devices, all of which could be FETs in this example. Let's say you'd want to convert 28-MHz signals to 50 MHz on transmit, and convert 50 MHz to 28 MHz on receive. The first step would be to determine the correct LO frequency, which would be 50 − 28 = 22 MHz. A JFET oscillator using an MPF102 or J310 could be constructed to run at 22 MHz, using a third overtone crystal.

Next, you'd need a way to mix that signal with a 28-MHz source to yield the desired 50-MHz frequency. A 3N204 MOSFET would work well here, with its output circuit tuned to 50 MHz. Since the 3N204 is a dual-gate MOSFET, it is ideal for mixing two signal sources. Since it is a high-impedance device, you'll be able to work with low-level LO and i-f sources. And its performance will also be fairly linear.

Finally, you'll need a way to mix 50-MHz received signals with the LO to come up with the i-f again, so another 3N204 is selected for much the same reasons as in the TX mixer. This device has a fairly good noise figure and lots of gain at 6 meters. The completed bare-bones transverter is shown in Fig. 2.

Great! The whole thing can fit in a small case and run off a 9-volt battery. The only problem is that you might want to run a bit more power output on transmit. And you'd like a bit more signal to work with on receive as well. Time to add rf amplifiers, such as VHF silicon bipolar transistors (examples: 2N2369, 2N4427) after the TX mixer, bringing you up to the .5-Watt level. And another 3N204 rf amplifier ahead of the rf mixer to improve sensitivity. Now we've progressed to Fig. 3.

Still not satisfied? How about yet more power at 50 MHz, by adding two stud- or flange-mount rf power devices (2N6080, 2N6082) to bring the output up to 10 Watts? Better put them in their own shielded case as well. As a matter of fact, why not add some sort of simple transceive switching scheme using diodes, transistors, and a relay? Put the whole thing in a case with the necessary connectors, and we've moved to Fig. 4.

Remember that the core function of the transverter hasn't changed one iota with all of the add-ons. You still have a transmit mixer, receive mixer, and local oscillator doing most of the work, and you have them doing it at very low signal levels. This is probably the one concept most amateurs have trouble with regarding transverters! The power required to make the receive mixer work is infinitesimal. Consider that a typical signal at 50 MHz might be .2 uV, or about −120 dBm. The receive rf amplifier stage will probably kick this up about 16 dB or so to −104 dBm, or a bit over 1 microvolt. The RX mixer will add about 14 dB in conversion, making the total conversion gain 28 dB and presenting a signal to your i-f receiver of about −90 dBm, or 7 uV.

On transmit, it's very much the same. Most linear transverters use two MOSFETs in a dual-balanced mixer scheme to improve linearity, but they need very little in the way of i-f excitation to do their job. Consider the typical transverter with four active stages of rf amplification, running 10 Watts output. Such a transverter might only need a signal level of 0 dBm, or 1 milliwatt, to achieve full rated power, and most commercially made transverters on the market today operate in that power range. The conversion gain through the transmit section is then 40 dB from 1 mW to 10 W.

You'll also find that driving the TX mixers with much more than 1 mW will yield no additional output, and at this point the TX mixer is saturated. When saturation occurs, the TX mixer is at the end of its linear mode of operation, so more drive will result in spurious mixing products and distortion of the original waveform. This is why most transverters have on-board attenuator networks, usually resistive. These attenuators allow up to 300–500 mW of energy to be applied without significant harm to the TX mixer stage.

Higher drive levels require more attenuation to dissipate the excess drive, and such attenuators are available in up to 15-dB, 10-Watt models most frequently used with 144-MHz multimode transceivers. I've often seen transverters for 432, 1296, and higher damaged because the user forgot to incorporate the external high-power attenuator and applied 10 Watts across 300 mW of resistors, destroying them and the TX mixer stages (sometimes even the RX mixer as well)!

You could conceivably build a high-power linear transverter using a power tube, such as a 4CX250B, and drive it with a few Watts of energy at the i-f and a few Watts of LO injection, but this would be a bit impractical because of size and power requirements! Indeed, early linear transverters used balanced-mixer tubes such as the 7360 to get up to VHF frequencies with a few Watts of i-f excitation.

The important thing to remember is that properly designed transverters are linear devices. After all, we've just seen that they are essentially mixers with add-ons! That means that any type of i-f signal can be reproduced faithfully at the desired transmit frequency, and any type of received signal can be downconverted. AM, FM, SSB, CW, RTTY, ATV...it makes no difference to the transverter! This is why I've long favored using transverters with HF radios for superior VHF and UHF operation, instead of costly multimodes. Why spend all of that extra money when the linear transverter does its job so well, so simply, and so inexpensively?

Remember, too, that the linear

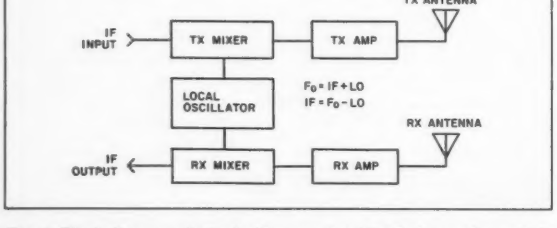

Fig. 1. Block diagram of a typical transverter. Pin diode or relay switching is often used between the TX and RX antenna.

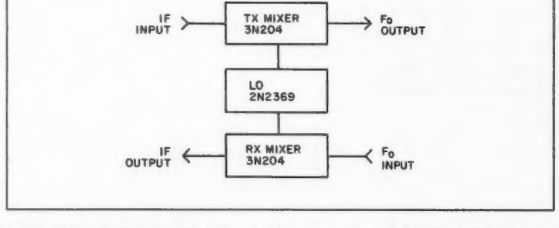

Fig. 2. Here is the simplest form a transverter can take—two mixers and a local oscillator (LO).

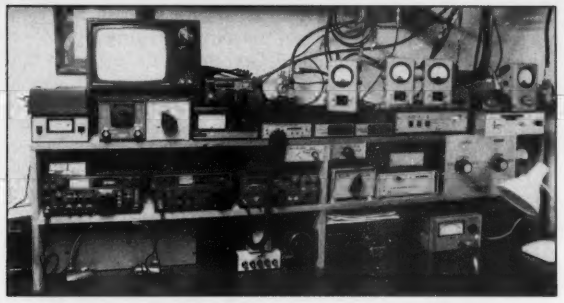

Photo A. Here's a front view of the operating position at KT2B. HF transceivers and VHF exciters are on the left side, while transverters and VHF/UHF amplifiers are on the right.

transverter allows you to employ all of the bells and whistles on your HF rig, such as filter options, scanning, dual vfo's, even general-coverage receiver options! One ham I know uses his 2-meter transverter and TS-430S in AM mode to listen to the local airport transmissions in the 130-MHz range.

Thanksgiving Openings

Checking the mailbag, Mike Rhodes W8DN of Celina, Ohio, writes in to talk about the openings experienced throughout parts of the country last Thanksgiving (of all times!). Mike is active on both 2 meters and 70 cm using an ICOM 745 and Microwave Modules MMT-144/28R and MMT-432/28S linear transverters. (How appropriate!) In Mike's words, "...I thought you might be trying to compile a pattern for the Thanksgiving Day VHF/UHF openings so here is an extract from my log...I was unaware of the opening until late Thursday evening after the holiday guests had left. It was just plain luck that I even bothered to turn on the rig! [That's the way it usually happens, Mike!]...Boy, am I glad I did! I'm a newcomer to VHF/UHF (except 2m FM).... This was my first real opening. What a beaut!"

Mike goes on to discuss his observations regarding the power needed to make consistent contacts, especially on 432 where he found that 40 Watts was all he needed to bag QSOs in EN93 (Ontario), EM15 (Oklahoma City), EM28 (Kansas), EM35 (Arkansas), FN20 (New Jersey), and FN02 (New York), among others. Mike, it looks as if you were busier than a one-armed paperhanger! He also observes that the 25 Watts on 2 meters was a little less than he needed to get through the "20-meter-like pileups on 144.200 MHz!" This has long been a problem on 2, and it doesn't make much sense considering how much bandwidth there is to use.

Yours truly was busy nursing a cold and visiting relatives in Vermont and found out about the opening after I returned home. Of course, I've always maintained that all I have to do to make 2 meters open up is go on vacation with no equipment. It never fails. I appreciate your input, Mike, and ask other readers with evidence of this sustained tropo opening to send along some logs or anecdotes. And we thought all the good propagation was over by November 1!

UPDATE

Charles Osborne WD4MBK of the Southeastern VHF Society has computed the correct coaxial balun length for KLM's 144- and 220-MHz antennas (using RG-142 Teflon™ coax). For 144 MHz, the length should be 31.6 inches shield to shield. For 220 the length should be 20.75 inches shield to shield. Add one-half inch to each end to allow enough wire to go to the spade lugs.

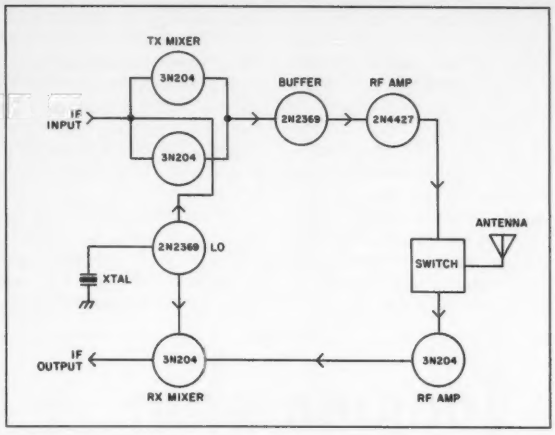

Fig. 3. We've now added a buffer amplifier and rf amplifier to the TX line, as well as an rf amplifier to the RX line and a TX/RX switch.

COMING UP

Several interesting items have arrived at the shack lately for review purposes, among them the Kenwood TS-711A (yes, I'm finally getting around to reviewing it!), ICOM IC-275 mobile multimode, SSB Electronics LT33S 902-MHz transverter, Microwave Modules 50/28R 50-MHz transverter, and yagis for 144 and 902 MHz from Tonna. I've even heard rumors that a new Yaesu 727 dual-band HT is on the way as well. One thing is certain: I won't run out of VHF and UHF equipment to review in the near future.

I'd like to hear your input on some of these items if you are already using them in your station! Feel free to drop me a note and list any observations you have—likes, dislikes, whatever. In fact, I'd like to hear more about your station and operating habits—favorite bands, equipment, interesting contacts, and the like. Send along photos if you have them, ideally black-and-white prints.

In that vein, I'll show a recent shot taken of my station which I recently remodeled, adding sheetrock walls and insulation to make it look nicer and stay warmer in the wintertime. To the left side of the picture, you'll notice an IC-740, an IC-551D, and a TS-430S. The 551D is on loan from Mike Crawford WA2VUN, but the IC-740 and TS-430S are my workhorse rigs. The 740 finds most of its use on HF (yes, I actually operate those bands, too!), while the 430 serves as a transverter driver through the switch panel to the extreme right.

Transverters are employed on 2, 220, 432, and 1296 from the switch panel. A fifth position brings the 28-MHz XMIT and RCVR lines to front-panel BNC jacks for bench-testing purposes. Solid-state amplifiers run 200 Watts on 2, 120 Watts on 220, and 130 Watts on 432, with a single

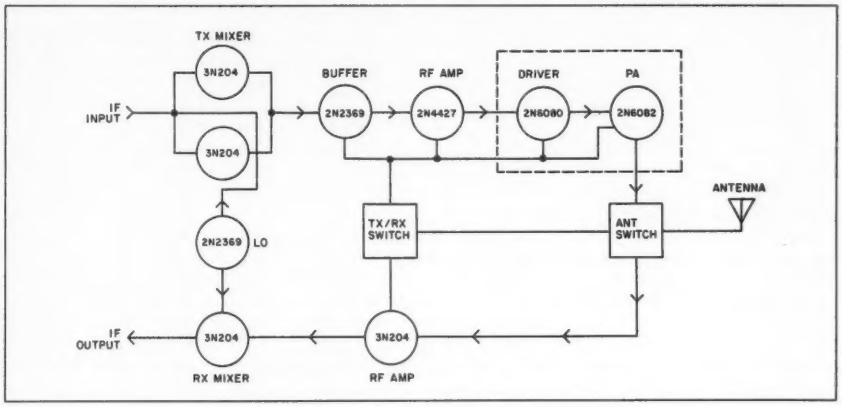

Fig. 4. Now we've added a driver and PA stage, as well as transceive switching.

3CX100 tube running 80 Watts on 1296. Yes, I like Bird wattmeters, before you ask. Below, the main power supply is an Astron RS35. Next to that is the Boonton 92 rf millivoltmeter, and next to that a Bird 600-Watt dry dummy load.

Cables pass through a special plywood window panel and are supported with an elastic shock cord. The shelf brackets originally were designed to hang plants from, but they make great test cable holders as you can see. Overhead multi-drawer storage cabinets facilitate parts storage, and I've got plenty of spare parts for every type of application including spare FETs for preamps, which I used to blow up quite regularly years ago. I also added a phone, which is very helpful during contests!

The television usually sits upstairs, but I was busy repairing some equipment and watching a football game when the shot was taken, using my Cushcraft 32-19 Boomer as a television antenna on channel 7. It works great, by the way! Just out of the picture to the left is a 6-foot rack cabinet, with the Hewlett-Packard 608F signal generator; 14-volt, 15-Amp supply; 1-kW, 144-MHz amplifier; 300-Watt, 432-MHz amplifier; and 2000-volt, 1-Amp power supply for contest work.

All of these rigs feed the following antennas: on 160 and 80 meters, a B&W ac 1.8–30 wire antenna. On 40 meters, a bazooka, and on 20-15-10, a Cushcraft R3 vertical. On 50 MHz, I use a KLM 7-element yagi @ 40'; on 144 MHz, a Cushcraft 32-19 @ 50'; on 220 MHz, a KLM 14-element yagi @ 55'; on 432 MHz, a Tonna 21-element yagi @ 45'; and finally, on 1296 MHz, four 23-element Tonna yagis in an H-frame @ 58'. I employ 7/8" hardline at 1296; 1/2" hardline at 432; and 9913 at 220, 144, and 50 MHz.

That's it for this month! See you in April, Above and Beyond! ■

LOOKING WEST

Number 19 on your Feedback card

Bill Pasternak WA6ITF
28197 Robin Avenue
Saugus CA 91350

PIRATE COORDINATION VS. THE FCC

Establishing your own repeater council to lend an air of legitimacy to an uncoordinated repeater can place you in jeopardy of FCC sanction if that system causes even the slightest interference to a legitimate and recognized repeater in that geographic area. This is according to FCC Special Services Division Chief Raymond A. Kowalski, who issued a letter of interpretation of the revised amateur repeater regulations as set forth in the Report & Order on PR Docket 85-22.

The interpretation comes as an answer to an informational request filed before the commission by ARRL VHF Repeater Advisory Committee Chairman Joe Eisenberg WA0WRI of Lincoln, Nebraska. Eisenberg, who also serves as Nebraska State Frequency Coordinator and as the Nebraska representative to the multi-state umbrella organization called MACC (the Mid-America Coordination Council), had been asked to help arbitrate a long-standing dispute between a local frequency coordinator serving the Kansas City area and the two statewide councils serving Kansas and Missouri. The latter had claimed the right to handle coordination for the Kansas City area on a shared basis, since the city lies on the Missouri River and is therefore divided between the two states.

Both statewide councils refused to recognize the work of a local Kansas City area frequency coordinator who had been performing repeater coordination for many years and who had the backing of the local radio club council. As discussions between the two opposing factions had brought no result, Eisenberg decided to obtain guidance from the FCC; he presented them a list of facts and issues as professed by both sides.

Bureau Chief Kowalski explained to *Westlink Report* that the FCC could not interpret its own rules to satisfy any one particular case. Its interpretation, while citing the situation in Kansas City as a specific, in fact, affects all amateurs, all repeaters, and all repeater councils.

We spoke with Ray by phone, and he gave *Westlink Report* the gist of what his letter to Eisenberg said: "When the FCC enacted PR Docket 85-22, it said, 'We encourage local coordinators to participate in a regional or umbrella entity.' Our letter of November 13 interprets that language to mean that where there is a regional entity—as there is in the Missouri and Kansas areas, which have in fact determined who the rightful coordinator is in Kansas City—then that is the rightful coordinator, and people who operate with coordination from anyone else do so at their peril. It is the licensees of the repeaters, not the coordinator or bogus coordinator, who are risking sanctions if interference occurs."

We asked Kowalski if this action were aimed at ridding amateur radio of the many pirate coordination councils that have been springing up of late to challenge the long-established and bona fide repeater coordination operations and spectrum management entities in various cities nationwide. "The mechanism for making them go away is that they are exposing other people to jeopardy," said the FCC Bureau Chief, "and we are not going to hear of other people saying, 'Well, how did I know?' We are putting them [all amateurs] on notice right now!"

How can you tell who is and who is not a valid frequency coordinator for your geographic area? The simplest method at this time is to consult the latest issue of the ARRL *Repeater Directory*. While not an absolute bible as to who is who in frequency coordination, it is the most accurate listing to date, and according to Bart Jahnke KB9NM, who serves as its editor, the League takes as many precautions as are humanly possible to ensure the accuracy of this publication.

Westlink Report contacted Jahnke and asked several questions pertaining to the way in which such listings are developed. KB9NM replied that the *Repeater Directory* lists only repeater coordinators that it knows exist and that are active. In the case in which a regional coordination body exists (as favored by the FCC in PR Docket 85-22), the *Repeater Directory* mentions the local council(s) recognized by such a body.

Where one repeater council or coordinator has been replaced by another, the *Repeater Directory* attempts to obtain, by confirmation in writing, the current coordinator's identity. Additionally, "made-to-order" coordination councils are not recognized unless (a) the area in which they claim to coordinate has been proven to be vacated by a previous coordinator or (b) the proper election has taken place by either the general amateur population or by the owners/trustees of ALL repeaters that fall under that jurisdiction. Jahnke added that "the ARRL attempts to authenticate the validity of any and all coordinators/councils that it lists in the *Repeater Directory*. These listings are generated with the best information available to us at that time."

Does the FCC recognize coordinators and councils listed in the ARRL *Repeater Directory* as being the "official entities" of given geographic regions? Bureau Chief Kowalski notes: "The statements that were made about it (by FCC officials two to three years ago) were made at a time when the ARRL *Repeater Directory* was the only thing there was as far as a listing of coordinated repeaters. But, since that time, PR 85-22 has come out, and since that time the amateur radio community has begun to explore the notion of regional councils, of umbrella organizations, and they have begun to explore the idea of a nationwide data base. So, I would not say that the fact that you [a repeater] appear in the ARRL *Repeater Directory* has the same weight that it had, say, two years ago, but, on the other hand, it still is a good indication (to the FCC) that this repeater is coordinated, and at least it is a place where, until something better comes along, coordinators can look to see if there is anybody on a particular frequency.

"It [the ARRL *Repeater Directory*] is the kind of thing that someone says, 'Well, wait a minute. This stray coordinator has come along and coordinated somebody on this frequency, but I can produce lists going way back some 10 years (including listing in the ARRL *Directory*) that show that I have been there all of the time and that anybody who is looking to coordinate (a new repeater) could have looked it up in this well-known source.' So I think that it [the ARRL *Repeater Directory*] indeed does carry a lot of weight."

What can a repeater coordination council that feels it is truly the rightful representative of a given

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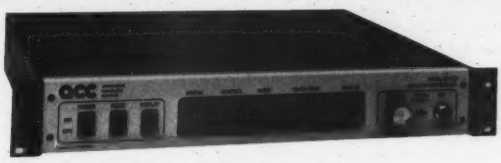

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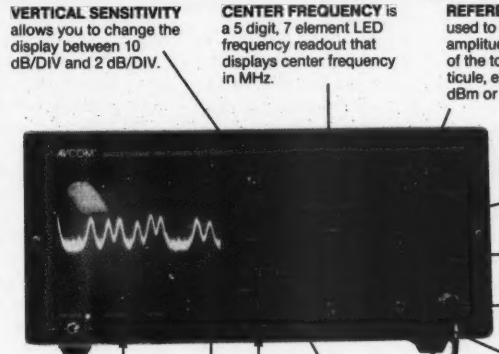

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area do if it thinks that it has been treated unjustly by a larger regionwide or another existing coordinator/council? Kowalski suggests that using the electoral process might be a solution, but he also notes that such an election must include ALL amateurs of a given geographic region and not just those hams who serve on repeater councils or who own repeaters.

Who would bear the cost of such an election? That he cannot say. But, an election of this type would necessarily include the costs of printing and distributing secret mail-in ballots, an independent "Committee of Tellers" (probably located out of that region to provide election security to count the votes), an agency willing to lend its support to certify the outcome so that it could not later be challenged in court, and the rest of what goes into holding such an above-board election. All of these costs would probably fall to the challenging coordinator, since the established coordination body has no reason to spend its funds on such an election, and the ARRL has made it clear that it intends to "stand clear" of the political aspects of the repeater coordination and spectrum management process.

The letter of interpretation sent to VRAC Chairman Eisenberg, along with the very tight guidelines established by the ARRL to obtain a "Coordinators' Listing" in the ARRL *Repeater Directory* as outlined above, means, in reality, that a self-professed pirate frequency coordinator will not be recognized by either the FCC or the ARRL, and that those repeaters who try to evade the regulation of an established and recognized coordinator face the prospect of severe sanctions and penalties if their operation causes harm to a coordinated operation. It also means that if a repeater coordinator says that "the band is full and there is no room for your new repeater because it will interfere with already existing machines," then you had best not even consider putting it up.

Thanks to VRAC Chairman Eisenberg, the word of a frequency coordinator now appears to hold the weight of FCC regulation. To again quote Division Chief Ray Kowalski: "That ought to go a long way toward strengthening and putting teeth into what the commission said as far as how you tell the rightful coordinators. We [the FCC] are not going to put up with 'fly-by-night' pirate coordinators!"■

QRP

Number 24 on your Feedback card

Mike Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

DAYTON SCOOP

As I promised last month, I'm going to scoop everyone with news of the Dayton Hamvention '87. But, before I go on with the plans for '87, I'll look back at Dayton Hamvention '86.

The Belton Inn provided us with the 10th and 11th floors. Things started to cook on Thursday with Jim Fitton setting up the hospitality suite. After dining out on pasta, the group returned to the hospitality suite and talked about antennas, with Brice Anderson W9PNE showing off his waist-high 30-to-10-meter micro-loop antenna. This job was the sequel to his last Field Day experiments.

The fact that one table was covered with some of the best-looking home-brew gear I have ever seen was worth the trip to the hospitality suite. With those small backpack rigs lying on the table and with the micro antenna present, well just guess what we did? Seemed as if we loaded up everything within reach of the radios.

I sure would like to know what that one guy was doing with our antenna sinker on the 3rd floor. Every time we dropped the antenna out over the patio and down the side of the hotel, someone would cut off the wire the weight was on. Good thing the weights were empty cans of beer!

The main QRP booth was manned by Leo KC5EV, and Jim KK7C took control of the flea market spot. Membership sign-up sheets were at both locations.

Now I can understand why everyone in W6-land is laid-back. Bob W6SQK led more than 35 of us through the back alleys of downtown Dayton looking for our banquet hall. After eight blocks of walking, we finally made it. Wits in place of Watts, that's what it took to communicate with each other at the banquet. Much fun was had by all. Back at the hotel, some chest pounding—about the best DX, Field Days, antennas, and such—was exchanged till the wee hours of morning.

Saturday at about 4 p.m. we had an official QRP ARCI meeting. Since I am on the Board of Directors, I discussed issues that helped determine the direction of the club for the coming year. We lacked one member to have a quorum. Issues that had to be voted on were done so via the mail.

That evening, many well-known QRPers showed up, including Adrian Weiss W8RSP, Chris Page G4BUE, Jerry Trotten K8IRO, Les Shattuck W2IPX, and Jim Fitton W1FMR. Several awards were given out to individuals recognizing their efforts in QRP.

The QRP forum started Sunday morning. Chris Page was speaking on QRP in the UK. I knew he would have been a hard act to follow, so I started off the forum with a talk on my favorite subject—solar energy and QRP. Then Chris gave his talk, and Les Shattuck discussed the direction of the club. Ade Weiss tied things all together with a question and answer session. What a time we had—more than three hours spent talking QRP.

That was last year. What can you expect this time? Well more of the same, only better. First things first. We again will be staying in the Belton Inn in downtown Dayton. Once more Jim Fitton will be taking care of the rooms. I urge you to call Jim at (617)-374-3594 for more information. Collect calls will be answered by his cat, Fred. If you want, write to Jim at PO Box 58, Ward Hill MA 01830. Remember, I write this in early December, so the rooms may be very close to being gone by now. Rates will be about 35–40 bucks for a double room. Jim will be able to give you more updated information about cost.

This year the QRP ARCI will have a commercial booth set up. This will enable us to sell memberships, books, and perhaps a small kit or two. Do be sure to stop by and say hello.

Bob Spidell W6SKQ will take us on another tour of Dayton after dark—on foot, I'm sure.

If nothing else, stop by and see all the home-brew radios in the hospitality suite. Who says hams don't build? QRP operators do! I have a good feeling that we may see some CCW (Coherent CW) rigs there. Think of it. Running 3 Watts into a longwire with Q5 copy using a Tandy Model 100 and a CCW home-brew rig. It's even more fun if everything is done portable.

Since it is early, I don't know when the QRP forum will be. I do know that I will be giving a talk on home-brewing and solar-powering of QRP rigs. I received a letter from Rev. George Dobbs G3RJV saying that he might make the trip over here with Chris Page this year. If so, it looks as if it will be a very interesting forum.

Photo A. Close-up view of the backpack special. Notice the two batteries to the right.

Photo B. Alan Pike fires up on 40 meters for a few QRP QSOs.

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My wife will also be set up with official "Hate Mike Bryce Club" forms. She plans a sellout. Give the kids to Grandma, gas up the ole auto, and make plans for a great weekend filled with good friends, QRP, and good food. Come to the Dayton Hamvention, the "Wright" place to be.

BACKPACKING QRP

I like to operate portable QRP. Alan Pike W8MGF sent me a letter and the photographs shown here. Alan likes to get out and away from it all by backpacking into the boonies and operating QRP. He says:

"I am into backpacking and am a member of a group of guys that go hiking every year. We always take off the first week after Labor Day. It takes some extra selling with the wife, but is well worth the effort. For six days last September we tackled the trail that goes along the shore of Lake Superior, primarily in Pictured Rocks National Park in the upper peninsula of Michigan.

"This year, I decided to make a concerted effort to take ham radio along with me. I packed an MFJ-40T transmitter, a handful of FT-243 crystals for 40 meters, a Kantronics 8040B receiver, a hand key on a piece of masonite, and a dipole cut for 7.040 MHz. Power was two 6-volt lantern batteries wired up to give me 12 volts. Everything except the batteries fit in a small pack which I attached to my backframe.

"At the first campsite, I strung the dipole between a couple of pine trees using 80-lb. test monofilament line and called CQ. My first contact was Mac WB2HCT in Lawtons, New York. My nonham trail buddies were duly impressed. In the next five days, I logged a little more than 50 contacts in 12 states plus Canada.

"Thunderstorms on the final night shortened my operating time and I quickly took down the dipole. We weathered the storm and walked into Munising, Michigan, the next day. The only thing that got wet was me and the log book. Both dried out fine.

"It was a real kick to sit on a log overlooking Lake Superior, deep in the Michigan woods, and be able to talk to hams all over the Midwest and East. For me, it was a poor man's DXpedition. Hanging around 7.040 was a plus, too. Several hams went the extra distance to pull me through when they discovered I was QRP and on the trail as well.

"I encourage your readers to try combining the accomplishment of backpacking in the boonies with the sport of QRP. It probably is not a bad safety backup either."

Well, I'm impressed. Looks as though Alan is very serious about combining two of his hobbies into one. Any more hikers out there who would like to tell their stories? What is the best antenna to use in the outback? I'm sure that everyone would like to know. I do.

UTC	CW	SSB	Novice
14–16	14.060	14.285	
16–17	21.060	21.385	21.110
17–18	28.060	28.885	28.110
18–19	7.040*	7.285	7.110
19–20	14.060	14.285	
20–21	21.060	21.385	21.110
21–22	28.060	28.885	28.110
22–23	7.040*	7.110	
23–00	14.060**	14.285	
00–01	7.040*	7.285	7.110
01–03	3.560	3.985	3.710

*Some other countries use 7.030.
**Transcontinental QRP Net—Join us!

Table 1. First-Sunday schedules. The QRP ARCI sponsors an informal QSO party the first Sunday of each month at the following times and frequencies. Try CW on the hour and SSB and Novice frequencies on the half hour. Join in to get acquainted with other QRPers.

FIELD DAY

Speaking of operating in the field. The big one is coming. You know, Field Day. I would like to run a special Field Day column, but need your input. Do you have a special "death-ray" antenna? How about your operating secrets? Everyone does some chest pounding when it comes to Field Day. The time is near, so drop me a line, and I'll get it printed up.

QRP ACTIVITY

Several of the letters that I have received ask where they may find active QRP operators. The QRP ARCI sponsors the First-Sunday QSO parties. This is not a contest, but rather an informal get-together to meet with each other and exchange ideas on QRP. Table 1 shows the schedule. Do give it a try.

One more place to look for QRP activity is on 30 meters. Look for QRP CW signals on 10.105 and 10.120 MHz. All are encouraged to call and listen on these frequencies.

MORE TO COME

I plan to have a busy year with the QRP column. Next month I will try and do the Field Day special. Look out for columns on solar power, operating tips, antennas, contesting, and more. As I have said in the past, it is your column. Tell me what you would like to see, and I'll do my best to get it printed. I welcome photographs, just make sure they have a lot of contrast and are in focus. Black-and-white are the best to send, but color ones are fine if they meet the above requirements. Sorry, if I send them in to be printed, you will not get them back. Make copies to send to me.

I try and answer all letters, but I sure would like an SASE. My postage bill is growing out of line. For those who would like to send mail via CompuServe E-mail, my ID number is 73357,222. However it's done, I really appreciate the input. Until next month, enjoy the upcoming spring season and QRP operation. ■

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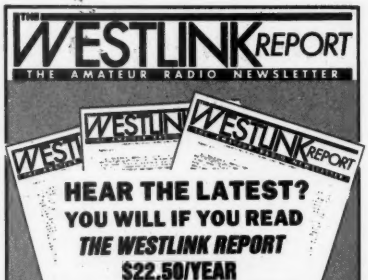

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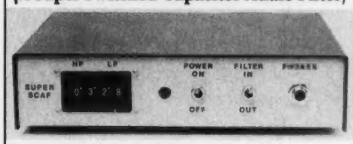

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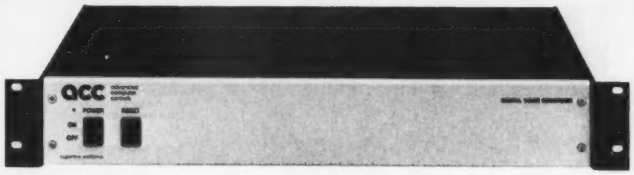

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FANTASTIC

That's how satellite chasing has been since last time. I have made numerous contacts via Radio 5, Radio 7, Fuji-OSCAR 12, and AMSAT-OSCAR 10. I can't guarantee that things will stay this way till this material gets to press, but it brings home an important point about the amateur radio satellite program: Never give up on a hamsat until everybody agrees that the last signals have been heard. Even then, surprises can occur. All of my AO-7 activity (several hundred QSOs) occurred long after the on-board batteries gave out.

Last month I discussed FO-12, other operational hamsats, tracking methods, and projects of the distant future. This month I'll start with updates on our present group of communication spacecraft, follow with some historical perspective on the modes of operation used to communicate through transponder-type satellites, and continue with projections into the near future. These "crystal ball" activities include the proposed frequency plans for the Soviet Radio 9 and Radio 10 satellites as well as the French Arsene satellite.

Updates

Radio 5 and Radio 7 (identified by RS5 and RS7 on their respective CW beacons) have failing batteries. During periods of eclipsing, their operating schedules are severely shortened. I can recall times when nothing was heard for days. When the satellites experience periods of continuous sunlight, though, signals have been great and QSOs are numerous and enjoyable. It doesn't take much to get copyable signals from these satellites. I use a dipole and an HF transceiver with a homebrew preamp to receive the 29.4–29.5-MHz signals.

AO-10 is another satellite that many have already written off. The radiation damage to the onboard memory has made it nearly impossible to uplink even simple commands to the satellite. The command team has worked tirelessly to keep AO-10 useful and in reasonable health. Perhaps it can continue to function until the launch of Phase 3C (AO-10's replacement) later this year. The DX is still out there, but if you find the transponder "ON," use low power and avoid operation around perigee.

FO-12 continues with no problems. Due to the 1500-km altitude and the 50-degree inclination, passes are about as long as Radio 5 and Radio 7 (1660-km altitude). The inclination (angle that the satellite's path makes as it crosses the equator) of FO-12 does allow for a lot of eclipse time—up to 30 percent or as little as zero, depending on the relative positions of the sun, earth, and satellite. Due to power budget constraints, schedule changes will likely be implemented every few months. Presently we have three days of linear transponder activity, two days of "digital," and two days in the recharge mode.

The Modes of OSCAR

Until August of last year, most amateur satellite enthusiasts have had only a few operating "modes." These included mode A via the Soviet Radio satellites with 2m uplinks and 10m downlinks; mode B on AO-10 with 70 cm up and 2m down. Now we add modes "JA" and "JD" via FO-12. Mode JA is a standard linear transponder with 2m up and 70 cm down, while JD is the digital packet transponder. But what is the background of these modes?

The first amateur radio transponder in space was on board OSCAR 3. It was similar to a linear 2m translator with an input at the low end of the band, and output just 1.8 MHz higher. It was a 2m repeater in space. OSCAR 4 had a VHF/UHF transponder with a 2m input and a 70-cm output. It was the first amateur crossband satellite.

Our first long-life satellite was AO-6, using the now-familiar 2m uplink and 10m downlink system. AO-7, launched in 1974, had two transponders and four modes of operation. The modes were logi-

Mode A	
Uplink	145.860–145.900
Downlink	29.360–29.400
CW Beacon	29.402
ROBOT Transponder	
Uplink	145.820
Downlink	29.320

Fig. 1. Proposed transponder configuration for Radio 9.

Photo A. AMSAT-OSCAR 7 QSL.

Photo B. Radio 7 QSL for QSO with on-board "ROBOT" in "Cosmic Space."

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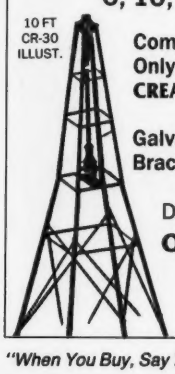

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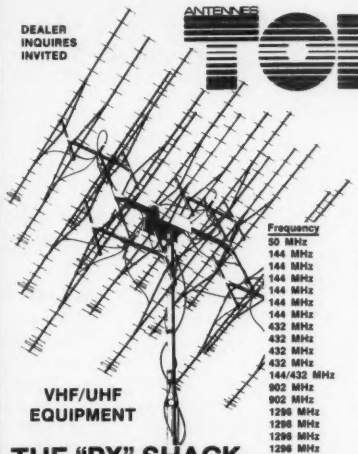

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144 MHz	9 Element	11'4"	140-148	6.6	$ 55.00
144 MHz	2 x 9 Cross	11'8"	140-148	7.0	$ 86.00
144 MHz	13 El Portable	14'6"	139.5-148.5	7.7	$ 78.00
144 MHz	17 Element	21'6"	138.0-148.7	12.3	$119.00
432 MHz	9 Element	4'1"	409.3-440.2	2.6	$ 59.00
432 MHz	19 Element	9'3"	415.5-442.3	4.2	$ 68.00
432 MHz	21 Element	15'1"	416-440.6	6.8	$ 81.00
432 MHz	2 x 19 Cross	9'6"	415.5-442.3	6.6	$ 75.00
144/432 MHz	9/19 Oscar	9'10"		7.0	$ 78.00
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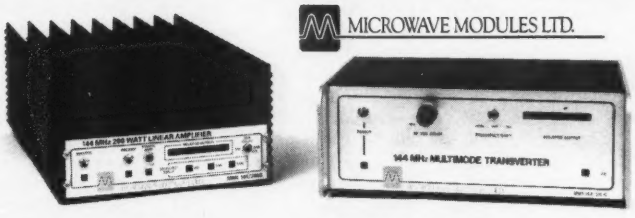

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Downlink	29.460–29.500
Beacons	29.457
	29.503
Mode K	
Uplink	21.260–21.300
Downlink	29.460–29.500
Mode T	
Uplink	21.260–21.300
Downlink	145.960–145.995
Beacons	145.957
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ROBOT Transponder	
Uplink	21.140
Downlinks	145.957
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Fig. 2. Proposed transponder configuration for Radio 10.

Mode B	
Uplink	435.050–435.150
Downlink	145.850–145.950
Beacon	145.830
Mode F	
Uplink	435.050–435.100
Downlink	2446.490–2446.540
Beacon	2446.470

Fig. 3. Proposed transponder configuration for Arsene.

cally called A, B, C, and D and were the output states of two control flip-flops. Significantly, this labeling initiated generic transponder labels. Mode A referred to the 2m to 10m link, B was the 70 cm to 2m system, and C represented the reduced-power B operation. Mode D was simply the battery recharge mode. AO-8 was to be a simple replacement for AO-6, but thanks to JAMSAT (the Japanese affiliate of AMSAT) it also carried a mode J transponder with a 2m uplink and a 70-cm downlink similar in idea to that on board the short-lived OSCAR 4.

The same year AO-8 was launched, two Russian satellites, Radio 1 and Radio 2, were placed into higher-altitude (1,700-km) circular-polar orbits. These were mode A devices and were the first hamsats from the Soviet Union. The receivers were extremely sensitive but were also very susceptible to overload. The transponders didn't last long, but the Radio 1 beacon on 29.4 MHz was heard at times even in 1986, although the CW data is meaningless.

In 1981 we greeted six new Russian satellites from a single launch. Two were 10m beacons (Radio 3 and Radio 4), two had mode A transponders (Radio 6 and Radio 8), but the final two (Radio 5 and Radio 7) had both transponders and on-board "ROBOTs" that made serial-numbered CW QSOs from "Cosmic Space," as the QSLs read.

A year later, ISKRA 2 and ISKRA 3 (student experimental satellites) were deployed from Salyut 7. Neither satellite lasted long—about two months for ISKRA 2 and a little over one month for ISKRA 3. It was the first attempt at mode K, as the Russians called it. The transponders were to have 15m uplinks with 10m downlinks. Although ISKRA 3 had heat problems, an oscillating power regulator, and a blown transistor, some mode K success was reported in Europe, while ISKRA 2 was never commanded out of the beacon mode. The Russian RS series has provided the starting point for many newcomers looking for a taste of satellite activity without making a large commitment of money and time. The satellites functioned quite well with reasonable coverage and reliable operation.

Mode B on AO-10 has offered us a chance to communicate via satellite with others for hours on end. Due to a transponder malfunction, AO-10's mode L (24 cm up and 70 cm down) did not become the new mode of preference. A few hundred stations worldwide managed to achieve the additional 10–15-dB uplink power requirement forced by the failure of a bias regulator in the downlink transmitter. For most, however, mode L remained just a curiosity.

Today we still have occasional operation via Radio 5, Radio 7, and AO-10. With FO-12 in orbit, many long-time satellite enthusiasts have come back on-line, while newcomers are discovering the interesting characteristics of a J-style transponder. FO-12 delights us with a highly functional and fascinating medium for reliable, but short, contacts. We have yet to realize the potential of mode JD, the digital mode on this new satellite. The possibilities are exciting.

Future Hamsats

In mid-June of 1986, the International Frequency Registration Board (IFRB) of the International Telecommunications Union (ITU)

Photo C. Home-brew Fuji-OSCAR 12 modem using the G3RUH circuit board. The modem interfaces the radio to a standard packet TNC for mode "JD."

Photo D. Rear view of the FO-12 modem.

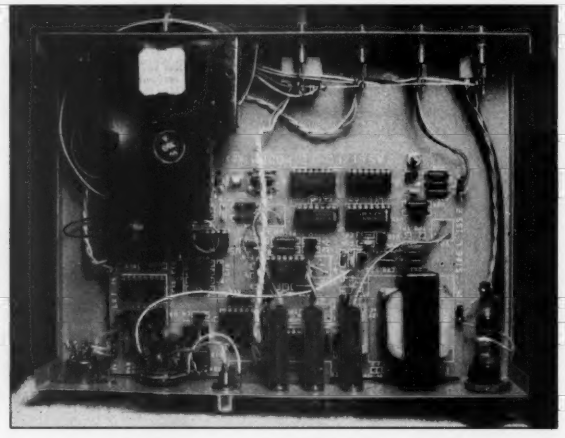

Photo E. Interior view of the FO-12 modem.

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received documents from the USSR concerning the proposed launch of two amateur satellites. The information contained orbital parameters, transponder frequencies that might be used, and other receive and transmit characteristics of the spacecraft. The planned orbit is to be inclined 83 degrees at a 1000-km altitude. The inclination is like previous Radio satellites, but the height of the orbit is lower, thus giving a period of about 105 minutes. Recently, specific frequencies have been announced, and according to sources in Europe, the transponder modes, as shown in Figs. 1 and 2, define the Radio 9 and Radio 10 satellites. Note that modes K and T on Radio 10 can operate simultaneously.

Mode K operation has the potential for some very interesting over-the-horizon satellite contacts. When band conditions are good enough to hear the 10m downlink signals while the satellite is over another part of the world, conditions for the 15m uplink are likely to be excellent. Dipole antennas and HF rigs should certainly do the job for most of us. The only problem to watch for is receiver "desense." Listening on 10m while transmitting 100 Watts on 15m can be a real problem when both rigs are in the same room, especially if a preamp is in use. I have found that physical and electrical isolation of the receive system can really help.

Mode T promises to be a very interesting experiment. With a 15m uplink and a 2m downlink, just operating via this mode will be different from the standards of the past. Mobile operation comes to mind since desense will be very simple to eliminate. Downlink signals should be easily heard and free from ignition noise and other man-made interference. The "ROBOT" transponder on Radio 10 also uses the mode T format, another first.

Another satellite that may "take off" in the near future is the French Arsene Project. It was hoped that the French satellite would be launched with Phase 3C later this year, but project delays will postpone Arsene's debut until 1988. Fig. 3 shows the transponder frequencies. Modes B and F use the same uplink frequencies but cannot be in use simultaneously. They will alternate operation. The 100-kHz-wide B transponder is actually composed of four 25-kHz-wide segments, each with an independent agc. This will limit the effects of high-power ground stations (that may cause the transponder to overload) to a single 25-kHz-wide segment of the passband. Arsene is nearly a yard high, a yard wide, and weighs 300 pounds (100 pounds more than AO-10). I'll be reporting more information on this project as the launch date comes closer.

Nets

With new satellites on the horizon and schedule changes to our present hamsats occurring all the time, the AMSAT nets can be invaluable. There are satellite-chaser nets going on somewhere in the world every day, but the most prominent one is the 20m AMSAT International Net every Sunday at 1900 UTC on 14.282 MHz. Others that may be more convenient for your schedule include three Tuesday night 75m nets. The "East Coast" version starts at 9 p.m. (EST or EDT), followed by the "Mid-America" net at 9 p.m. (CST or CDT). The "West Coast" net takes over at 8 p.m. (PST or PDT). There are VHF and UHF nets in many of the larger metropolitan areas, but begin with HF. These nets have been in operation for years and may surprise you with their coverage and information content.

Correction

I gave you a wrong company name last month. NH Enterprises (22104 66th Ave. West, Mountlake Terrace WA 98043) markets an interface for the VIC-20, C-64, and Timex 1000 in conjunction with potentiometer rotators such as the Kenpro KR400/500.

Until next time, good satellite hunting! ■

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PACKET POLL RESULTS

The Great (or not-so-great) Packet Poll of 1986 is now complete. See the December, 1986, issue if you haven't the slightest idea what I'm talking about. Much to my surprise, most (about 500) of the responses came in via packet radio, and most of them were relayed via the HF forwarding system. Fortunately, the 14.109 system was in place when all this started; otherwise, there would have been a real mess. I discussed some of the logistics last month.

Some Stats on the Stats

There were 601 responses total; 63 came in on paper via the mail. There were 330K bytes of data in the messages received via packet; most of that was header lines.

The raw results are below. I'll provide more commentary next month. Note that as with most computer rounding, the percentages won't add up to 100%. Also, some things will show up as 0% even though there were some responses in that area.

Also contributing to the total for a question is the "no answer" or "other" responses. For questions where this answer was large, I'll make a special note.

A large number of BBS sysops answered the poll, 26% of the total responses in fact. This number may be out of sync with the true proportion of BBS sysops in the total packet population. For this reason, I've included three columns of responses; the first is for the entire group of those responding, the next is for those not claiming to run a BBS or a digipeater, the third number is for those running a BBS. I have not shown the digipeater owners separately.

For an example of why this is important, look at question 12: 94% of the sysops have a radio dedicated to packet, but only 58% of the non-sysops do. The figure for everyone (including digipeater owners) is 70%. On the other hand, no matter how you interpret this, a significant number of users have a radio dedicated to packet. Maybe the rest are in the market for one. (Any manufacturers reading this?)

When there was more than one answer in the response to a question, only the first one was tabulated.

There were a total of 601 responses—373 in the not-BBS category and 127 in the BBS sysop group. The rest were digipeater owners.

As I said last month, special thanks go to the BBS ops who forwarded responses to me, and who forwarded my acknowledgments back, and in particular to WB6KAJ.

	Total	Non-BBS	BBS
1) Sex:			
A) Male	96%	95%	98%
B) Female	3%	4%	1%
2) Age:			
A) 15 or below	0%	1%	0%
B) 16–21	2%	2%	2%
C) 22–39	46%	46%	47%
D) 40–59	42%	39%	46%
E) 60 and up	9%	12%	5%
(Packet isn't bringing in the younger set as much as I'd hoped it would.)			
3) License class:			
A) Novice	0%	0%	0%
B) Technician	15%	16%	14%
C) General	14%	13%	16%
D) Advanced	35%	35%	39%
E) Extra	33%	35%	28%
4) Number of years licensed:			
A) 1 or less	2%	3%	0%
B) 1–5	13%	17%	7%
C) 6–10	20%	20%	20%
D) 11–20	28%	25%	32%
E) 21 or more	36%	34%	41%
(Sysops seem to have a longer time in grade.)			
5) Year you first used "packet":			
A) Before 1980	1%	1%	1%
B) 1980–1983	13%	8%	25%
C) 1984	16%	11%	31%
D) 1985	28%	28%	28%

E) 1986	42%	52%	15%

(There's a big difference between groups.)

6) I first heard about packet from:

A) Friends/on the local repeater	33%	30%	35%
B) Demo at a club meeting	12%	12%	12%
C) Demo at a convention	7%	6%	7%
D) Demo at Field Day	1%	1%	0%
E) Magazine articles	46%	50%	42%

7) My job is (or used to be):

A) Computer related	40%	40%	43%
B) Rf related	15%	14%	17%
C) Other	44%	46%	38%

(No wonder interfacing with our fellow hams isn't easy sometimes, we've forgotten what they do.)

8) Aside from jawing on the local repeater, has the majority of your amateur radio activities lately been packet-related?

A) Yes	79%	72%	94%
B) No	20%	27%	6%

9) Number of TNCs owned:

A) 1	58%	77%	19%
B) 2	22%	17%	28%
C) 3	10%	3%	30%
D) Many	9%	3%	23%

10) Do you use the AX.25 protocol?

A) Yes	98%	97%	99%
B) No	2%	3%	0%

11) Are you running (or do you also run) a protocol other than AX.25? (Also answer yes if you are pushing IP or other protocols through AX.25 UI frames.)

A) Yes	10%	8%	20%
B) No	89%	91%	80%

12) Do you have a radio devoted exclusively to packet?

A) Yes	70%	58%	94%
B) No	29%	41%	6%

13) Do you run a digipeater or other digital repeater where that station is up 24 hours a day and its primary purpose is to relay data for others? (Don't answer yes if you simply have DIGI ON set in your TNC.)

A) Yes	26%	0%	54%
B) No	73%	100%	46%

14) If you run a HOST/BBS system, do you:

A) Run a WØRLI or RLI-clone BBS	17%	0%	81%
B) Run a BBS that can forward to/from RLI systems	2%	0%	9%
C) Run a different type of BBS	2%	0%	10%
D) Do not run a BBS	74%	94%	0%
E) Other	4%		

15) Where do you use packet?

A) Mostly on VHF	81%	84%	71%
B) Mostly HF	2%	2%	4%
C) HF and VHF	16%	12%	25%

16) Your packet operation is:

A) Mostly real-time person-to-person chats	12%	16%	3%
B) Mostly BBS messaging/ file transfer	29%	23%	57%
C) Both	58%	61%	39%

17) Do you have a forwarding BBS (RLI-style) in reasonable range of your station (one or two hops)?

A) Yes	94%	93%	100%
B) No	5%	6%	0%

(Of course, this poll was more easily answered by hams with access to a BBS.)

18) Do you frequently use the forwarding feature of your local BBS?

A) Yes	52%	39%	90%
B) No	47%	60%	10%

19) Have you built or designed anything for packet, for your own use or others? This includes hardware (TNCs, modems, connect alarms, tuning indicators, etc.) and software (terminal drivers, BBS systems, etc.). Kits don't count.

A) Yes	46%	38%	63%
B) No	54%	62%	37%

20) Did you put your TNC together from a kit?

A) Yes	38%	30%	62%
B) No	61%	69%	38%

21) Would you be in favor of some type of "digital license," one that gave primarily digital privileges on non-HF frequencies, required a technical test with digital-specific questions, and did not require a Morse-code test?

A) Yes	53%	51%	54%
B) No	45%	47%	46%

22) Would you be in favor of something more than the question above, a "no code" license that gave wider ranging privileges on non-HF frequencies?

A) Yes	33%	33%	36%
B) No	65%	65%	62%

23) Are you against ALL types of codeless license?

A) Yes	37%	38%	36%
B) No	62%	62%	62%

24) Did you get your ham license as a result of hearing about packet radio?

A) Yes	2%	2%	3%
B) No	97%	97%	97%

25) Do you know of anyone who got his license as a result of interest in packet radio?

A) Yes	14%	10%	24%
B) No	86%	89%	76%

(These numbers should be better!)

26) The computer you currently use for packet is:

A) Commodore 64	26%	31%	9%
B) Apple II	6%	6%	2%
C) Z-80/8080-based system (Xerox 820, etc.) and IBM PC/XT/AT and clones	44%	34%	79%
E) Macintosh	3%	4%	2%
F) Dumb terminal	4%	3%	2%
G) Other	15%	20%	2%

(In the version sent out on packet, this question had two C answers. I made the adjustments and merged the IBM PC and Z-80 class for this report.)

27) On the computer you use for packet, do you have:

A) Floppy disk drive	66%	70%	53%
B) Small hard disk (10 meg or less)	5%	3%	11%
C) Large hard disk (greater than 10 meg)	18%	12%	35%
D) No disk storage	10%	13%	2%

28) What do you think about hams who send "digipeater on" beacons?

A) Tar and feather 'em	40%	34%	51%
B) Put 6" steel spikes in their eyes	6%	5%	7%
C) Put bamboo shoots under their fingernails	11%	11%	12%
D) Beacons don't bother you	39%	44%	28%
E) Other	4%	5%	2%

(Most of the A responses were A, B, and C. By the way, this one was sort of a joke. There were really only two answers: "Beacons bother me" and "Beacons don't bother me." Boy did I get a lot of heat on this one.)

29) The "packet network" available in 1986 is:

A) More then you thought it would be when you first got on packet	39%	41%	43%
B) Less than you thought	21%	20%	22%
C) Pretty much what you'd expected	39%	38%	35%

30) Is HF your only link to other packet users?

A) Yes	2%	3%	1%
B) No	97%	95%	98%

31) Is HF your only link to a BBS system?

A) Yes	3%	3%	2%
B) No	96%	95%	97%

32) Most of the data sent on packet today is message text or programs. There are also several other types of data, such as digital audio, digital video, graphics, telemetry, etc. Regarding non-text data:

A) You have used non-text digital communications	14%	13%	18%
B) You would use it if equipment was readily available	64%	63%	64%

C) You have little interest in non-text digital communications	20%	21%	17%
33) Do most of your packets go through a digipeater?			
A) Yes	61%	60%	64%
B) No	38%	39%	35%
34) How many digipeaters can you hit directly? (By digipeater, I mean a device or TNC on the air 24 hours a day with the primary purpose of being a digipeater. Remember to include all the frequencies in use in your area.)			
A) 0–2	23%	24%	18%
B) 3–6	43%	44%	43%
C) 7–12	21%	20%	23%
D) 13 or more	12%	12%	15%
35) How many BBS systems can you hit directly?			
A) 0	20%	21%	11%
B) 1–2	42%	42%	39%
C) 3–6	30%	29%	40%
D) 7 or more	6%	6%	9%
36) How many BBS systems can you hit using no more than one digipeater?			
A) 0	5%	5%	2%
B) 1–2	31%	32%	24%
C) 3–6	40%	40%	43%
D) 7 or more	22%	21%	29%
37) Have you used packet in a public-service activity?			
A) Yes	41%	33%	63%
B) No	58%	66%	36%
38) Do you think the current Part 97 regs on digital communications are:			
A) Too restrictive	39%	35%	56%
B) About right	50%	54%	38%
C) Not restrictive enough	2%	3%	2%
D) Other	9%	8%	5%
39) Is packet a part of your local emergency communications plan?			
A) Yes	43%	40%	54%
B) No	22%	20%	24%
C) Don't know	33%	39%	23%
(Find out!)			
40) In your area, are the packet frequencies:			
A) Too crowded	39%	39%	40%
B) Sparsely populated	15%	15%	13%
C) Just fine	44%	45%	44%
41) In your area, how many VHF frequencies are in active use for packet?			
A) 1	14%	14%	11%
B) 2	23%	23%	20%
C) 3–6	49%	49%	50%
D) More than 6	12%	11%	19%
42) In your area, forwarding BBS systems are:			
A) Using too much channel time	18%	18%	13%
B) Not a problem	78%	78%	84%
C) Other	4%	3%	3%
(Of course, it's tough to answer this one as A) when you're typing the response into a BBS.)			
43) Regarding your packet use, do you:			
A) Use it less than you once did	15%	18%	8%
B) Use it more now than before	41%	34%	58%
C) Stayed the same	42%	45%	34%
D) Dropped it all together	1%	1%	0%
44) Were you a Baudot (RTTY) or AMTOR user before you started on packet?			
A) Yes	47%	42%	60%
B) No	52%	57%	39%
45) Enter the two character post office abbreviation for your province or state (in North America) or your callsign prefix (including number) if you are DX.			
46) You saw this poll:			
A) In *73*	29%	21%	16%
B) On a packet BBS	62%	70%	73%
C) On a phone BBS	5%	3%	7%
D) Other	5%	6%	3%

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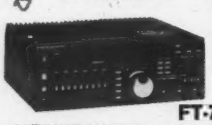

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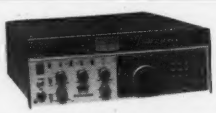

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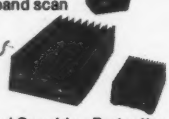

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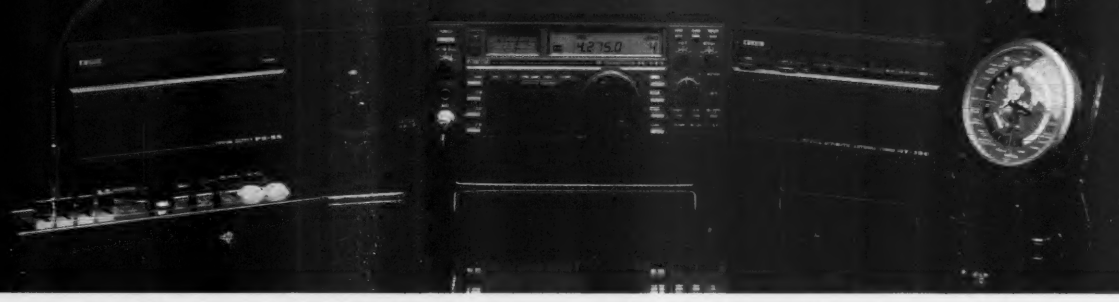

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NOTES FROM FN42

FIRST: *An apologetic note to our friends in the Federal Republic of Germany. We did not MEAN to give you a new flag last month —a flag with a band of* Grün *instead of* Rot *(our face is like* die rote Rübe*!). We might claim an existentialist approach to colors, and say it was green* vom grünen Tisch aus, *or say that it was green because this magazine is produced* im Grünen. *But we try to get away with something only when we are certain that we* can *get away with it. The simple fact is that a production error was made—a negative was mislabeled. We are sorry.*

There are five Independence Days in March: Morocco (3rd), Ghana (6th), Tunisia (20th), Greece (25th), and Bangladesh (26th). There are three National Days: in Syria (8th), Grenada (13th), and Malta (31st). Pakistan Day is on the 23rd; Taiwan has its Youth Day on the 29th. And Happy Birthday to Alexander Graham Bell (3rd) and Albert Einstein (14th). So send appropriate greetings and congratulations if you have a timely QSO. (If Mr. Bell or Mr. Einstein QSLs, let us know!)

In recognition of the tenth Pan American Games (to be held in Indianapolis, Indiana, in August) the U.S. Congress has designated 1987 as National Year of the Americas. Any Special Events you have planned will be mentioned here—let us know about them. Send to the Attention of 73 International.

Welcome to Finland! Jukka Kovanen OH3GZ/OH6GZ, QSL and Award Manager for the Finnish Amateur League sends word of Santa Claus Land (and Award) and a new QSL Bureau address (see below) and promises a story of "Peter Pacific trip" with photos for a future column. A one-year subscription will go to Jukka as our foreign correspondent and as Finnish Amateur League official.

ROUNDUP

Canada. The history and equipment of Guglielmo Marconi will be available for public viewing in the middle of this year at Glace Bay, Cape Breton Island, VE1CBF writes—if all goes as scheduled. The "Marconi Museum," funded by the federal parks department and other groups, will open on the site of Marconi's station, where the historic transatlantic message was logged. The Museum will contain a modern, fully operational station equipped for 160 through 2 meters, to be maintained and operated (daily during the Museum's season, it is hoped) by the Sydney Amateur Radio Club. A special callsign has been applied for.

Israel. Next month the Philatelic Service will begin issuing Israel's first postage stamp honoring the amateur radio fraternity . . . Packet comes to Israel and a special newsletter is being written by the Haifa Amateur Group for Digital Communications. Seen as the "Packet Radio Revolution" and "promising at least to be the biggest innovation in our hobby since two-metre repeaters," the IARC executive has designated 144.675 as the packet frequency. Two packet repeaters are in the planning stage, in Haifa and in Shoresh . . . Due to constant interference from clandestine transmissions from north of the border, R3, the Haifa FM 2-meter repeater may be accessed only by stations having their signals accompanied by a 192.8-Hz subaudible tone. A Haifa amateur has come out "with a brilliant innovation: a private-line generator using the Mostek MK5087N touchtone IC, a 455-kHz miniature resonator, 5 capacitors and 3 resistors. Cheap and easy to construct, the device can be installed in any radio." A similar PL may be installed on R1, the Jerusalem repeater, thereby silencing the occasional intermod and other undesirable signals (*from* Israel Ham News, *4Z4MK, Editor*).

People's Republic of China. Last month in this column, a prediction was noted that China would become the world's largest market for TV a few years from now, with enormous implications for all of the world's different cultures. The question was asked: What will hams, whose communications pass across cultural boundaries effortlessly, be doing to foster understandings and decrease misunderstandings between them? *73 Amateur Radio* hopes to do its part: We are responding to a letter from Chang-Han Dong (see Letters) by (of course) sending him the information he requests, but also we are inviting him to become a contributor to this column.

BRAZIL

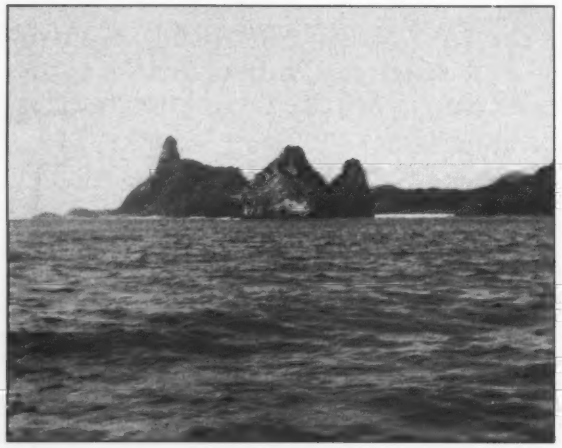
Carlos Vianne Carneiro PY1CC
Rua Afonso Pena 49, Apt. 701
20270 Rio de Janeiro, RJ
Brazil

ILHA FERNANDO DE NORONHA

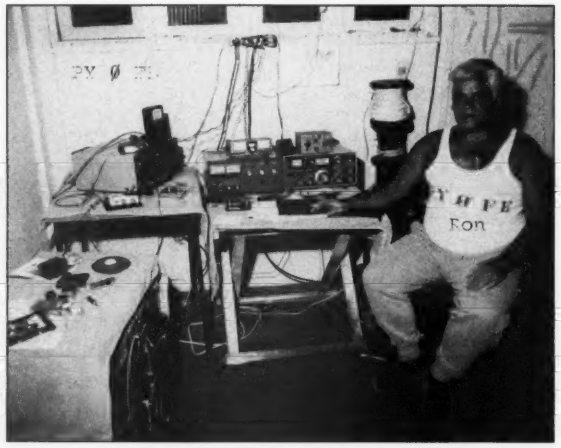
At about 32 degrees West Longitude and less than 5 degrees south of the equator, some 345 miles off the coast of Brazil, is the Fernando de Noronha Island group. It is home for the Brazilian PYØ–A and B class operators.

Ilha Grande, about 10 km long and 3.5 km wide, with a permanent population of 1,350, is the largest island. Like all of them, it depends entirely on Federal Government help since there is no way it can maintain itself. Food, goods, fuel, and sometimes even water are imported from continental sources. The Territory was created by Brazil during World War II for strategic purposes; every three years a governor is appointed by presidential decree—usually an officer of one of the armed forces.

A magic island for radio amateurs, this site for 24-hour propagation reaches out to all six continents on at least two or three bands daily, reaching you through



Fernando de Noronha, The Magic Island for 160-meter operation.



Ron PYØFE on Ilha Grande.

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* Eight front panel status indicators show Converse, Transparent, and Command modes; Multiple Connects, Data Carrier Detect, Push to Talk, Status, and Connect.
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* Modem disconnect circuits guarantee compatibility with future high speed modem applications and developments.
* Zilog 8530 SCC provides dependable hardware HDLC for higher speeds, and AMD 7910 for reliable modem performance without calibration.

While the PK-87 can be used for HF operation, AEA recommends the PM-1 packet modem as a high performance front end for best results in HF packet service. Only the new AEA PK-87 has all these features. Contact your local AEA dealer and join the packet revolution today by ordering the new PK-87.

Prices and specifications subject to change without notice or obligation

-65

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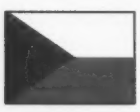
any antenna you raise, no matter how simple. We know we are coming to the end of a NO-propagation period, maybe next year [written in 1986], but at Fernando Noronha this phenomenon simply does not exist! A DXpedition to the islands means a sure hit, no matter date or time!

Ron PY1BVY, our enthusiast for DXpeditions, has just spent some two weeks at Fernando de Noronha as PY0FE and had a very successful CW operation in spite of the island's "shuttling" power from 190 to 205 volts, moving difficulties from one operating site to another, and the daily conflict between his radio amateur desire to keep operating during the lunch hour at best propagation times and hunger for lunch at the island's only hotel, 3.5 km away. Nevertheless, he made 4,008 QSOs with 89 countries on six continents. On his pet band, 160 meters, Ron made 620 QSOs during 11 nights, reaching 65 countries. There were 163 Russian stations reached, 73 in Czechoslovakia, and 238 in the States.

Very special QSLs were printed, and pretty soon all QSOs will be answered. Ron thanks Air Force Brigadier Milton Pauletto (now in command at Fernando de Noronha) and EMFA (Armed Forces HQ) for the extraordinary facilities provided him, and LABRE RJ, Radio Amateurs League, for contacting DENTEL authorities and allowing the use of the former PY0FE call used in the 1983 DXpedition to these islands. Ron's next goal is St. Peter/St. Paul Rocks, and knowing him as we do, well, it's just a matter of time....

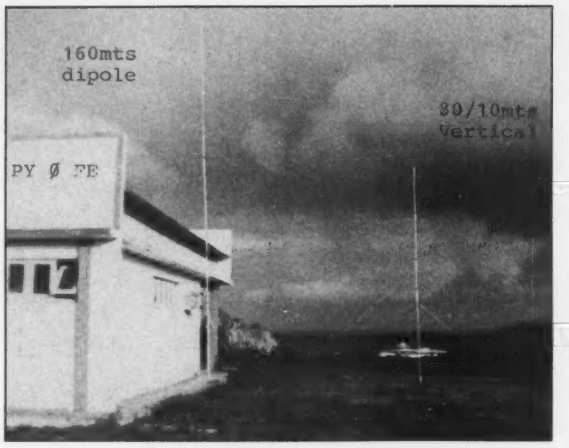


CZECHOSLOVAKIA

Rudolf Karaba (OK3KFO ARC)
Gogol'ova 1882
955 01 Topol'cany
Czechoslovakia

AMATEUR ORGANIZATION

All radio amateurs in Czechoslovakia, including SWLs, are united in the organization called SVAZARM, which provides free all necessary services: QSL service, diploma agency, manufacturing of and the provision of receiving and transmitting equipment, publishing and distributing handbooks for training in every branch of our hobby.



Antennas on Fernando de Noronha.

There are several thousands of amateur radio shortwave listeners in the nation, especially among the youth. Most amateurs have passed the examinations and operate through the some 500 club stations. One is eligible for a license at age 10; youths get experience with the help of the older operators, and qualify for a license after making 500 contacts in a club station.

There are two kinds of licenses, one for VHF operation (no Morse code required) and one for HF and VHF, which requires passing a Morse code exam. Every licensed operator is allowed to operate CW only, at first, on 1.8, 3.5, and 28 MHz, with the output power up to 19 W on 1.8 and up to 25 W on the others, and all legal modes of operation on VHF bands from 145 MHz up.

Young people 15 to 19 who have properly qualified can obtain special permission to work club stations. Their calls will be issued with the prefixes OL1–OL0 depending on geographic location; suffixes will always be three-letter ones. At age 18, one may apply for a personal license for HF and VHF bands, class C or class D. The first permits 10 W on the 160-meter band, 25 W for 3.520–3.600 MHz and 28.100–28.200 (CW only), and 145 MHz and up (all legal modes). The second is for 25 W on VHF bands only.

It is possible to pass through further exams for class B after a year in class C. Then 100 W output on all amateur bands, all modes (except 160, which is 10 W for everybody). After three more years, a class A license may be applied for, permitting 300 W output. A special 1-kW permit may be requested by class A operators for use in contests or for technical experimentation.

Class A, B, C, and D licenses will have callsign OK1, OK2, or OK3, depending upon QTH, with two- or three-letter suffixes. OK4 denotes operation from a ship; OK5, 6, 7, and 9 are special-event stations; OK8 is the prefix for foreigners licensed in Czechoslovakia; and OK0 is for VHF repeaters.

Licenses are for five years; they are free, as are extensions. There are no reciprocal agreements, but anyone may make an individual request for a license. There are some 2,200 licensed operators in the country.

The Central Radio Club of Czechoslovakia offers a variety of diplomas for radio amateurs worldwide; every second weekend in November is the OK–DX Contest, open worldwide. I'll write more about them later.

Thanks to Jiri Pecek OK2QX, publisher/manager of CRC, *Riedlova 12, 750 02 Prerov, Czechoslovakia, and Josef Stolcar OK2YN for the above information.*

FINLAND

Jukka Kovanen OH3GZ
Varuskunta Rak 47 As 11
SF–11310 Riihimaki 31
Finland

Please note a new address for the Finnish QSL Bureau: Box 30, SF–00381 Helsinki, Finland. The old address, Box 1, 00751 *is closed*.

SANTA CLAUS AWARD

The Worked Santa Claus Land Award is now available for qualifying contacts made after January 1, 1986—20 points required for Europe/OH stations, 15 for Europe, and 10 for stations elsewhere. Contact with OH9SCL (situated at the Arctic Circle in Finnish Lapland) is worth 5 points (10 points in December); contacts with OH9, OF9, OG9, and OI9 stations are one point each (3 each in December). There are about 150 OH9 stations.

No band or mode limits; same station can be counted only once; one SWL report per station counts as one contact.

Award stickers also available for each repeat of the same number of contacts required for the basic award.

Report the date and UTC for each contact, callsign, RST, frequency, and mode. Send with $6 or 10 IRCs (for postage and handling) to OH9AB/Award, PO Box 50, 96101 Rovaniemi, Finland; for stickers, only a self-addressed envelope is required along with your report. *Remember to give us your address when writing to us!!*

NEW ZEALAND

D. J. (Des) Chapman ZL2VR
459 Kennedy Road
Napier
New Zealand

The 1987 ZL Field Day dates will be Saturday, March 14, between 0300 UTC and 1200 UTC, and Sunday, March 15, between 1800 UTC and 0300 UTC, operating on 40 and 80 meters, phone, and CW. Field Day stations may be worked once on each mode in each hour of the operating periods. ZL FD stations listen out on CW for overseas contacts when propagation is suitable.

The changes to the New Zealand Amateur Operator certificate structure will *NOT* have any effect on the reciprocal licensing arrangements in operation at present. The appropriate license will be issued to the visiting amateur according to the qualifications of his/her current license

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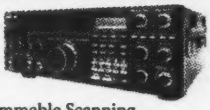

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April 24, 25, 26, 1987

Early Reservation Information

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• License exams • Free bus service
• CW proficiency test • Door prizes

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets

A maximum of 3 spaces per person (non-transferable). Tickets (for all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Special Awards

Nominations are requested for "Radio Amateur of the Year", "Special Achievement" and "Technical Achievement" awards. Contact: Awards chairman, Box 44, Dayton, OH 45401.

License Exams

Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send current FCC form 610, copy of present license and check for $4.25 (payable to ARRL/VEC) to: Exam Registration, 8836 Windbluff Point, Dayton, OH 45459

Slide Show

35 mm slide/tape presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

1987 Deadlines

Award Nominations: April 4
Lodging: April 4
License Exams: March 28
Advance Registration and banquet:
USA - April 11
Canada - April 4
Flea Market Space:
Orders will not be accepted **before** January 1

Information

General Information: (513) 433-7720
or DARA, Box 44, Dayton, OH 45401
Flea Market Information: (513) 223-0923
Lodging Information: (513) 223-2612
(No Reservations By Phone)

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Lodging Reservation Form

(Please attach your name, address, and telephone number to this form.)

Dayton Hamvention - April 24, 25, 26 1987
Reservation Deadline - April 4, 1987
MAIL TO - Housing, Dayton Hamvention, 1880 Kettering Tower, Dayton, OH 45423-1880

Arrival Date _____
( ) Before 6 pm ( ) After 6 pm
Departure Date _____
Room: ( ) Single
( ) Double (1 bed, 2 persons)
( ) Double Double (2 beds, 2 persons)

Lodging Preference -
See list of Lodging on adjacent page.

1 _____ 2 _____

3 _____ 4 _____

Deposit required - Room deposit must be paid directly to the hotel or motel by date shown on the confirmation form sent to you. Use canceled check for confirmation.

(PLEASE SEPARATE)

Advance Registration Form

(Please attach your name, address, and telephone number to this form.)

	How Many		
Admission (valid all 3 days)	_____	@ $8.00*	$_____
Grand Banquet	_____	@ $15.00**	$_____
Women's Luncheon (Saturday)	_____	@ $7.25	$_____
(Sunday)	_____	@ $7.25	$_____
Flea Market (Max. 3 spaces) *Admission ticket must be ordered with flea market tickets*	_____	@ $23.00	$_____
		Total	$_____

Make checks payable to - Dayton HAMVENTION.
Mail to - Dayton Hamvention, Box 2205, Dayton, OH 45401

* $10.00 at door ** $17.00 at door, if available

when it is submitted with an application. If you have any questions about all this, please get in touch with Russ Garlick ZL3AAA, 23 Lydia Street, Greymouth, New Zealand, or with me. But please remember: You must allow yourself sufficient time to obtain the application forms and to get answers to your questions so that your completed application, in duplicate, and the photocopies of the necessary documents reach New Zealand in plenty of time to be processed before you arrive—say three to four weeks before you get here.

73 International reminds you to send IRCs with any of your queries to overseas destinations to cover postage for the requested responses.

HONG KONG

Philip J. Weaver VS6CT
PO Box 12727
Hong Kong

First of all, may I take this opportunity to wish all *73* readers a very Happy and Prosperous New Year from everyone in Hong Kong!

In December, after my five-month around-the-world trip, I decided to stay on in Hong Kong regardless of the 1997 issue. [The Crown Colony 99-year lease ends then, and China has indicated its intention to regain sovereignty over Hong Kong at that time.] I've lived here 13 years now, and this is the place for me. I'm negotiating to buy the top floor of a 20-story apartment building, with a shack already on the roof; I have a Japanese-made aluminium tower (hand-carried from Tokyo!), and hope to be in residence by the time you read this, and on the air by Easter. I will concentrate on 10 through 20 and leave the low bands to Paul VS6DO, who has just acquired a rig with which he hopes to get DXCC on six; he has it on 160 already.

The Annual General Meeting of HARTS in December resulted in my being back again as president. HARTS monthly general meetings will be on second Tuesdays, 1930 hours, in the Volunteer Officers Mess, second floor of Beaconsfield House (next door to the Hilton Hotel in central HK). All visitors are welcome...which reminds me to recap on the licensing of hams in Hong Kong.

We follow the United Kingdom system, basically, with class A and B licenses. Reciprocal licenses can be issued to those showing they will be resident for over 90 days; all you need to do is provide a copy of your license and passport (for the records) and HK $130. A license can usually be issued in under an hour. A Hong Kong address is required for under-90-day visitors, who will get a reciprocal license based on their home call/VS6. The rules pertaining to country and kind of license are those of the U.K.

HARTS had an expansion year in 1986, with the new B class members and, of course, with new overseas personnel coming in all the time. We welcomed back VS6EY and BL, who keep those interested in CW very happy! Membership stands at 271 from among the 427 who are licensed (157 class A, 233 class B, 29 visitors, and 8 club stations). The High Interest Tech group members are experimenting with simplex voice digitizing using a Japanese kit, STR68PLV2, with a Toshiba T6668 voice processor. The two-meter repeater expansion has slowed some, and we still have only two on the air, on 145.650 and 145.750, both −600 input. Visitors are more than welcome to use them; call me at 5–419452 to get access information and latest news on the three additional repeaters we have planned.

The local ICOM dealership has no agent at the moment, but call 3–7393360 with your enquiries—this is the number of a new company, Waysun Communications. The Kenwood dealership is due to be lost by Pacifica Products this month [March], but the main dealer, Kenwood Lee & Co., is still available. Cecil Lee VS6XPZ and Raymond Leung VS6UF are there, at 5–251204, to serve you. For Yaesu we have Samson & Co., where K. T. Chan VS6XRJ can be found, telephone 5–776599, to help you.

We have been experimenting with packet radio for some time now, and have heard that we are legal to operate from Hong Kong on the 2-meter and the 70-cm bands and soon on the HF bands. With no distributor here for any of the new TNCs, the most common solution has been to go to America for the AEA PK-232—which we find is made right here in Hong Kong...but we can't buy it here, at a discount...We've had negative responses to our suggestions...Any comments, AEA, if you see this...?

If you happen to be tuning across 10 meters and hear some dreadful AM signals, it most likely is eminating from somewhere in Asia. It has been a chronic problem here and bitter complaining has had little effect since most of the transmissions appear to be coming from taxis. Roadblocks occasionally catch some, but that's only the tip of the iceberg. Part of the problem is the easy availability of CB equipment, which can operate above 28 and even into 29 MHz with only minor modification.

Talking about ten meters, let me remind you that we do have a beacon on 28.290 (VS6TEN) and another on 50.075 (VS6SIX). During 1986 I maintained contact with A4XIZ on 28.595, who normally monitors that frequency from 05–1130Z each day when his work permits.

I'll give you a further report from Hong Kong when my new address is established and I'll be in a position to offer any visiting ham the chance to operate from here—even, perhaps, doing some contesting, although I'm not sure yet what I'll be able to put up for the low bands as far as antennas are concerned. 73 from Hong Kong! ■

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Holiday Inn Dayton Mall
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Holiday Inn North
Holiday Inn South
Holiday Inn Troy
Knights Inn Franklin
Knights Inn Dayton North
Knights Inn Dayton South
Knights Inn Vandalia
L & K Motel (Brandt Pike)
LaQuinta Inn South
Marriott Hotel
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ATV

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Mike Stone WB8QCD
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NEW REPEATER

The Chicago area has a new ATV repeater under construction! The remote transmitter portion of it went on the air in December. The project is sponsored by The Peacock Amateur Radio Club, which is made up largely of broadcast engineer types at many of the area TV and radio stations. Henry B. Ruh KB9FO heads up the project.

Touchtone™ control of the remote transmitter (mode A) is being done on 144.31 MHz. The actual repeater (mode B) will have sync recognition access on UHF. Input to the KB9FO ATV/R is on 439.25 MHz and output is registered with the USATVS and the Illinois Repeater Council at 421.25 MHz. A weather radar feed has been transmitted for long periods of time to "burn in" transmitter equipment, to test the antennas, and to check propagation.

The new system has been seen as far away as Lafayette, Indiana, at P3–P4 levels. Local area users are seeing P3–P5 pictures, with most reporting color. We welcome Chicago's new experimental system. As with any new idea, it has met with resistance from a few of the established old-timers. When they realize the possibilities of this machine going up on the Hancock Building or the Sears Tower, criticism will disappear quickly. It's time the "Windy City" had an FSTV repeater.

The new repeater is horizontally polarized using Big Wheel antennas—no one will have to uproot and change polarization. Many people tried FSTV in the Chicago area and were either run off by the older establishment or gave up due to lack of fun activity. It's time to blow the dust off those rigs and give Henry a call on 144.340.

Giving Thanks

We had a major UHF opening here in the Midwest all the way out to the East Coast last Thanksgiving. Not only were the 432 SSB fellas having fun, but the ATV picture gang was in there as well. Bill Brown WB8ELK of Findlay, Ohio sent me some TRS-80C "digitized" off-screen, computer-reduced pictures of contacts made over Thanksgiving. He can fit 20 pictures on an 8-1/2 x 11 sheet of paper. Fig. 1 contains examples of his work.

590-Mile DX Record

A new all-time FSTV DX record was set during this period between Paul KØIWA in Burlington, Iowa, and Ed W3POS in Erie, Pennsylvania. This "live TV contact" covered 590 miles. Ed has been looking west for that kind of DX for many years. More Iowa ATVers could have worked Ed, but the phone call that got Ed on 144.340 came late in the morning, when everyone else had gone off to work or to be with the family.

The USATVS is compiling a registry of the best ATV DX contacts. Please write to me and tell me about your best long-distance television contacts. Send dates, times, callsigns, distances, signal reports, etc. Your entry will be placed and published. No fish stories allowed!

Dave WBØZJP in St. Louis rolled into Iowa (over 200 miles) P5 and in color for a neat Christmas present. KA9TGX, K9WZB, WB8URI, and others have been real strong in the late evening and early morning hours. Jeff KA9TGX of Lafayette, Indiana, and I stayed up from 11 p.m. until nearly 4 a.m. one night and watched the UHF band increase in intensity (and our two-way pictures along with it). At 3:30 a.m. we toasted the perfect color, snow-free, P5 pictures with a cold one.

I have attended several VHF/UHF SSB DX conferences, lectures, and hamfest talks over the years, and the speakers all seem to take great pride in their long-distance work. Let me tell you, there is no greater challenge than to use the same temperamental UHF band segment and get a wideband TV signal through all the QRM to the fella's TV set on the other end.

CoCo Updates

As a late follow-up to our previous VCR ATV use discussion, Hap Griffin WA4UMU (Griffin Enterprises, PO Box 6104, Sumter, South Carolina) sent me his latest version of Video Titler, a graphics program for the Radio Shack TRS-80C Color Computer. This neat program costs only $11.50 ppd. It features Colorbars, a great Hollywood style director's clapboard, and a large 5–4–3–2 number sequence that goes to black. You can enter information on the clapboard such as ATV-DX segments, home movie titles, etc. It is designed to be used in conjunction with your VCR for titling programs. If you have a VCR, a CoCo, and are on ATV, this program is highly recommended.

Facsimile

While we are talking about the CoCo, the latest version of COCO-RADIO is 5.0. Facsimile transmit has been added, along with all the other ATV, RTTY, SSTV, TVRO, OSCAR, Morse, CW, and other programs included in the three-disk package. For the latest information sheet, send me an SASE. This unique FAX transmit breakthrough can be sent at 120 or 180 lpm. 180 lpm means capability with a lot of older Western Union hard-copy machines. Martin Goodman's receive program in *Rainbow* magazine got a lot of amateurs interested in facsimile communications. WB8TPD's programs in *73* for the Atari ("One-Chip Facsimile," December, 1985) and the C-64 ("Just The FAX, Ma'am," October, 1986) brought similar interest. Fred Sharp W8ASF in Cleveland, Ohio, has built up a YU2 interface for quality high resolution. See Ralph Taggart's WEATHERSAT column for more information.

Check out the weekend HF FAX activity on 14.240–14.245 MHz. Several Japanese stations have been monitored (and printed) and are desperate for two-way U.S. contacts. Now that the FCC has given us permission to make use of the mode on HF frequencies, how come we haven't been doing it? There should be an increase now in the number of operators that can send as well as receive FAX pictures using the CoCo. C-64, IBM, Apple, and Atari owners have similar receive-only programs going. Let's all get together on Saturday and Sunday mornings at 10 a.m. Central Time at 14.240 MHz USB. Our first official meeting schedule will be held on March 14. Mark it on your calendar. I'd like to hear from some of you who are working the FAX Ham-TV mode. Send me some of your pictures.

Are you looking for a good, reasonably small HF shortwave antenna to pick up FAX pictures on? I recently installed an Alpha Delta model DX-SWL multiband sloper that works real well on the designed frequencies—13, 16, 19, 21, 25, 31, 41, 49, 60, 90, and 120 meters and the mediumwave band (0.5–1.6 MHz). It has even improved the signal strength level of frequencies like 8.080 MHz and NAM FAX signals. It costs $69.95 (plus shipping) and is obtainable from Universal Amateur Radio, 1280 Aida Drive, Reynoldsburg OH 43068; (614)-866-4267.

Dayton Preview

This year's Ham-TV get-togethers at the Dayton Hamvention are taking shape. The annual Don Miller W9NTP/Robert Suding WØLMD SSTV sessions should be conducted again at the Holiday

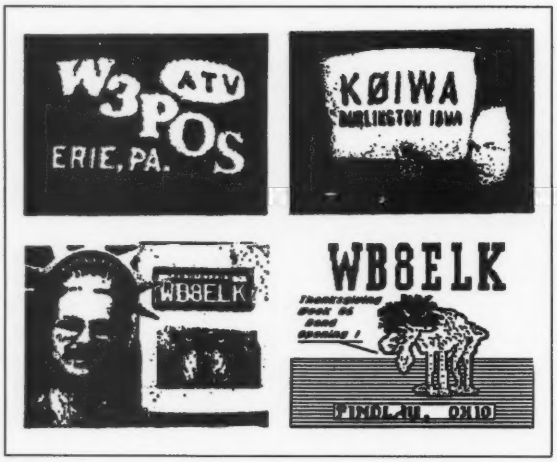
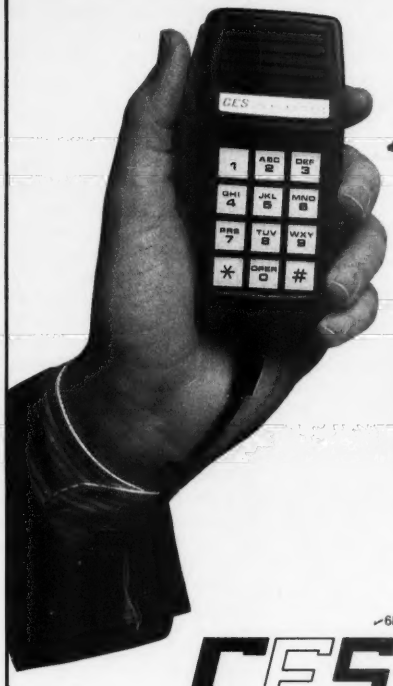


Fig. 1. Digitized computer-reduced pictures produced by WB8ELK on his CoCo. On top: W3POS and KØIWA, ATV DX record holders. On the bottom: WB8ELK hams it up during Thanksgiving week 1986.



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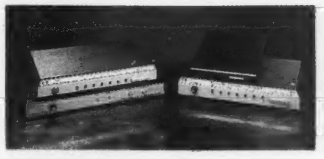

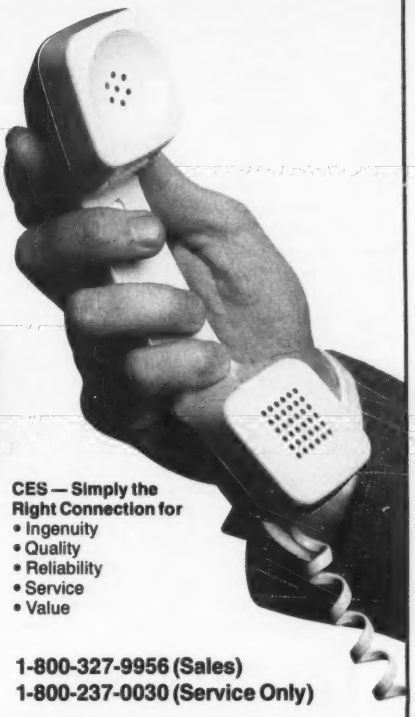

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Inn North beginning at 7 p.m. on Saturday evening. I'll give you all the details if Don gets them to us in time for the April issue—otherwise tune into the 14.230-MHz SSTV net as Dayton draws near. Don always assembles a good lineup.

We will be hosting our second FSTVer's Workshop this year at the Traveler's Motel North in Dayton (the old La Quinta North) where we met before. A large suite has been reserved to accommodate 50–70 people. There will be a $1 donation as you enter to help pay for the room and refreshments. This year we will offer an expanded session starting on Saturday afternoon at 2 p.m., with an informal open period for you to come in and rest your tired feet.

We'll show VCR tapes, align filters, and talk about what's going on in your part of the country on ATV. The Saturday night program begins at 7 p.m. A number of speakers have committed: John Beanland G3BVU/W1 of Spectrum International will give a technical talk on the importance of interdigital bandpass filtering for ATVers. Bring your portable VCRs and Camcorders.

The Traveler's North is known as the ATV hangout, so you might want to make reservations. A couple years ago we all set up FSTV stations and worked motel to motel simplex through the Dayton (vertical) Repeater. Talk frequency will be 147.570 (Dayton Repeater voice channel input) or 144.340 simplex.

"Please write to me and tell me about your best long-distance ATV contacts. No fish stories allowed."

The Dayton ATV/R

Here are some specifics about the Dayton ATV Repeater sent to us by Bill Parker W8DMR of Columbus, Ohio: It is located ten miles south of Dayton. Output is 20 Watts average on 426.250 MHz, with FM audio at 430.750 MHz. Input is on 439.250 MHz. I'm not sure if vertical or horizontal polarization is used. The repeater has 45-mile coverage. A two-meter FM voice input at 147.450 MHz brings the repeater ID up for 20 seconds. Dropping the two-meter carrier "reverses" the video ID. A second video and audio input at 1245.0 MHz exists. The 1245.0-MHz input is two-meter touchtone (TT) controlled. TT 0 turns the receiver on. TT # latches the ID on for three minutes. TT * resets the system. TT 5 brings up a weather radar video. TT 6 turns on the repeater. The DARA ATV Repeater is sponsored by the Dayton Amateur Radio Association and is maintained by Bruce WB8UGV in Centerville. DARA plans to increase the power to 200 Watts sometime this year.

At the Press

The new Spec-Com *North American ATV Directory* is at the press. It features an up-to-date USATVS membership listing, a guide to U.S./Canada/Mexico ATV repeaters, clubs and activity groups, 2-meter talk maps, DX honor rolls, ATV advertising, and a lot of other good information. If you'd like a copy, send $8.95 to the Spec-Com Communications Group, PO Box H, Lowden IA 52255. Mark 73 on the outside of your envelope. First mailings will be conducted right after Dayton.

A final reminder to keep filling out those Feedback cards and mailing them back to Wayne. It is your interest that keeps this column going. Send me some photos, gang. Until next month, see you "on the tube."■

RTTY LOOP

Number 26 on your Feedback card

Marc I. Leavey, M.D. WA3AJR
6 Jenny Lane
Pikesville MD 21208

UTU USES

March winds have blown in a whole raft of information this month, and wouldn't you know that most of it is RTTY-related? Well, here we go!

Thanks to Travis Brann, the Technical Services Manager at Kantronics, we have some more information on interfacing various home computers with RTTY stations. Of course their terminals, including some with built-in "smarts," are designed to interface with any computer capable of communicating with a modem, which runs the spectrum from a VIC-20 to an IBM PC.

Now, while this information is based on the Kantronics Universal Terminal Unit (UTU), I don't see why it could not be applied by the able ham to other hardware schemes. Nevertheless, I will use the UTU connector as the "standard" for this information, and pass along my sincere thanks to Travis for the information.

Fig. 1 shows the hookup needed for the Apple //c to interface with the UTU. With a standard Apple Term program, and the UTU connected but turned off, choose option "C" to change configurations and select the following parameters: half duplex, pulse dial, 300 baud, no parity, one stop bit, eight data bits, 30-second delay, and no line feed. Then enter the terminal mode, power on the UTU, and press RETURN>. When the UTU menu appears, turn off the echo and proceed as the manual directs.

PCjr users can use the UTU as well, with the UTU-TERM program designed for the IBM PC. Hardware interfacing can be accomplished two ways: by a PCjr adapter cable (a nine-wire cable that connects to the 16-pin connector on the PCjr and terminates in a standard DB-25 connector) or by wiring the UTU cable directly to the 16-pin connector. If you use the adapter, wire transmitted data (white) to pin 2, received data (brown) to pin 3, and ground (black) to pin 7; jump pin 4 to pin 5, and pin 6 to pin 20. If you are wiring directly to the PCjr connector, A4 is transmitted data, A8 is received data, and B2 is ground. Then, when you run the UTU, run UTU-TERM and follow the menus.

This same DB-25 hookup, using the three active pins (2, 3, and 7), will also work to interface a Xerox 820-II computer. For that matter, essentially any computer that supports standard RS-232-based interfacing should connect the same way.

VIC-20 or C-64 users, here's the dope for you. Fig. 2 is the hookup to the UTU connector to the user port of your computer. Fig. 3 is a short Basic terminal program. When you're using this program, the "#" key functions as an escape key, and the "@" key returns the system to receive when placed at the end of text while you are transmitting. Load this program from tape or disk, run it, then turn on the UTU. Press RETURN> and the UTU menu will appear.

Color Computer users, your hardware hookup to the serial port is shown in Fig. 4. There are a variety of terminal programs you may use to run with this one. I might mention MickeyTerm, a versatile ASCII terminal program available for downloading on both CompuServe and Delphi, in the Color Computer sections. Other programs, even cartridge-based ones, should work as well.

Tandy 1000 users, use the three-wire hookup described above, and enter DeskMate, which probably came with your computer. Select Telcom and set parameters as no autodial, 110 or 300 baud as desired, eight bit, no parity, one stop, X-on/X-off on, and all others off. Hit F5> for terminal mode; then turn on the UTU and hit ENTER>.

TRS-80 Model 100 folks, use the same three-wire hookup. Then enter TELCOM and type 38N1E,10 to set up your options. You should know the rest by now.

I do want to emphasize that, while I have been using the UTU as an example here, any "smart" interface should do fine. Additionally, other forms of interfacing may well suggest themselves from this data. My purpose here is to show ways to get data into and out of many personal computers for use on RTTY. Thanks to Travis Brann for helping to make this possible.

Now let's see, who are we leaving out? Dr. Siegfried Sprainys DJ4SS in West Germany is looking for information on Atari RTTY. He is the owner of two Atari 800XL computers and wonders, among other things, whether or not the Kantronics UTU will work with the Atari. I don't see why not. Assuming you have serial interfacing on the Atari, any terminal program should work just fine with a "smart" interface, such as the UTU described above. As I have said before, I can only publish what I find out about. So, if there is a lack of coverage in certain areas, it is only because individuals have not stepped forward with the information. Well, folks?

ZX-81/TS-1000 Add-Ons

Timex-Sinclair computer users

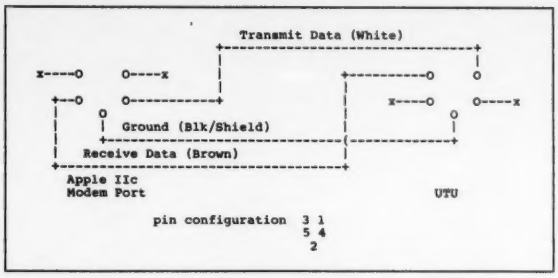

Fig. 1. Apple //c hookup.

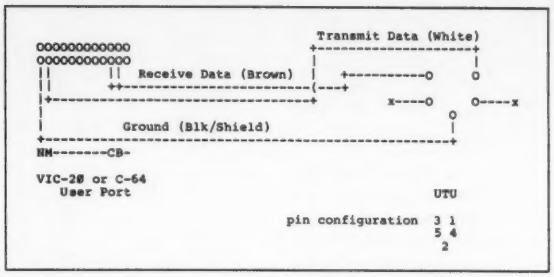

Fig. 2. VIC-20 or C-64 hookup.

get a boost from Bob Howard WA6DLI of West Covina, California. He tells us that he was anxious to mention that in the September issue of 73's RTTY Loop, the answer to VE2AGY's question about the TS-1000 was right there, under the ZX-81 banner.

"You see, Timex manufactured the ZX-81 for Sinclair and when they decided to market it in the U.S. under the Timex label as a TS-1000, they only added 1K to the memory to make it 2K RAM plus the 8K ROM. When either the ZX-81 or the TS-1000 is expanded to 16K, it is the same as the other machine in all respects. The TS-1500 is an improved TS-1000 with movable keys and a built-in 16K memory. The TS-2068 from Timex is the Sinclair Spectrum of England with improvements. With a Spectrum ROM in the cartridge dock or switched internally, a TS-2068 runs the 6000 Spectrum programs.

"The English ham programs include the G1FTU no-interface RTTY program that just connects to your transceiver speaker and mike plugs and feeds the computer mike and ear jacks for the cassette recorder (program save feature). This really works and the program is excellent in features. G1FTU has CW and SSTV programs also. The SSTV is receive only, of course. These may be purchased from a Swedish ham: SM3HBQ d/b/a Chara Electronics, PO Box 119, S-813 00 Hofors, Sweden. The Sinclair net on the air and the newsletter for U.S. hams (from K5XY in Las Cruces, New Mexico) are called QZX. The West Coast net is Saturdays on 7.235 MHz at 10 a.m. Pacific Time. The East Coast QZX net is on Sundays at 1600 UTC on 7.245 MHz. The 20-meter net is 9 p.m. Eastern Time on 14.345 MHz.

"Adding an external keyboard to the ZX-81/TS-1000 makes it an excellent ham computer. It will have better logic than more expensive computers and can be found in garage sales for $10–35, often with memory packs and a TV thrown in. I use the ZX-81 on CW, and with a screen to read the code, I find I have never bothered to tune RTTY [Thanks . . . mil] as the effect is about the same but more contacts are available in the CW bands. The NU4V CW software and interface copies signals weaker than my Kantronics Mini-Reader."

My thanks to Bob for this wealth of information on what may well class as one of the genuine bargains of the computer RTTY gram also. Most recently I have added a C-64 with a PK-64 for packet and AMTOR paralleled with the Apple II and can run immediate transfer between VHF and HF, HF and HF, and HF to VHF with the two systems tied together. I have also updated Galfo's original program with my own version with files, etc. As you can see, I have been at RTTY with the Apple for a long time. My problem and question to you is this: Has there yet been any good packet program written for the Apple comparable with the PK-64?

"If there is a lack of coverage in certain areas, it is only because individuals have not stepped forward with the information. Well, folks?"

crowd. Ten bucks? Even I might spring for one at that price!

Packet for the Apple?

On the E-mail wire this month, we find a message from Lee Cook of San Antonio, Texas. He says that he has been reading RTTY Loop for years and now has a question. He has been using an Apple II since 1977 on RTTY on ham and USAF MARS HF and VHF.

"Of course, at first I tied the Apple to a Model 15, then a Model 28, and now for the past five to six years I've been using an Epson MX-80 for the printer. It has always worked quite well. Originally in 1977 I was stationed with Dr. Galfo at Langley, Virgina, and, of course, the first RTTY program used was his, using my own hardware built directly into the Apple II. Since then I have built up about 50 or so Apple II, II+'s, and recently two //e's for MARS members. In 1981 I switched to the Super-RATT program, which started out at first as an AF MARS program and was later sold as a ham program also.

"The Apple has been with me as DL5LC in Germany, HZ1ZZ in Saudi Arabia, F@ATS in France, G5AVK in England, and ON8VV in Belgium. Since I now also have a II+ and //e, I would like to expand the Apple use into packet, but so far to no avail. One last thought: So far, all the RATT, CW, SSTV, and AMTOR programs for the Apple use the game port (Galfo, Super-RATT, and my own program), although the Egbert program uses the cassette ports.

"I feel packet is way too fast for the game ports to use, so I think it should use RS-232 interfacing. This is the problem with no known, to me, programs that use RS-232."

Well, Lee, I don't have any easy answers for you regarding interfacing other than via the game port. I took a survey of what I have noted and you appear to be right, zippo! Perhaps one of our faithful readers will drop us a line, and if so, I will pass the information along to you. One other note, if you can, why not share the modified program you wrote with us, here? I am sure that Apple users would appreciate the information.

Teletypes Are Junk

Another E-mailer is Dick W7EIO from Santa Ana, California. He writes: "I am a Western Union technician with years of Teletype® experience with 32s, 33s, 28s, 35s, and 15s. The selector magnets on 32s and 33s aren't 20 mA, but about half an amp through a magnet driver card, fed by about 35 volts. The card in a 32 also has motor control circuitry on it which can confuse a non-technician ham. Model 33s used as TWXs can be used on any computer network by phone as is, and the set can be used with RS-232, but the supply is ±20 volts, too much for most RS-232s.

"Teletypes need oiling and contact cleaning at least yearly or they will garble. When garble has set in, permanent damage has already started. The best oil is Air Conditioner Oil sold at Sears Repair Centers in a plastic squeeze bottle. Teletype machines are a specialized science and require knowledgeable technicians and clean signals free of bias and distortion, beyond most ham's capability. Parts for 32s and 33s are no longer available, so Western Union no longer overhauls or heavily maintains them, but junks them by the ton. These machines are worn out and unrepairable, and are no bargain.

"I also take exception to your 45-baud Baudot to 110-baud ASCII converter idea. Western Union has the Telex at 45-baud Baudot and TWX (Telex 2) at 110-baud ASCII, and now has a translation computer, but it restrains the 110 machine while the buffer and 45-baud terminal catch up. ASCII has many characters not available on Baudot, so the computer puts '/' on the Baudot machine in their place. It is a one-way street.

"For these reasons, I suggest you use discretion when talking

about old Teletypes. I wore out two 33s on CompuServe, and tossed them both when worn out. I am willing to help non-technician hams. I'm at 1413 N. Spurgeon Street, Apt. 8, Santa Ana CA 92701. SASE, please."

Well, Dick, 20 mA is the *loop* current, if not the magnet current proper. The driver card in the 33 and related series makes the internal operation transparent to the user. While I agree with you regarding service, I remember how happy I was when I acquired a tub of lithium grease through a local MARS group a few years back when I was active in that organization. The difference is time vs. money. It certainly is not cost effective for commercial communications enterprises to spend more than a machine is worth, in parts or people time, to repair a defective machine. However, amateur RTTY got its start with just such machines. I have fixed Model 15s with parts as strange as rubber bands from orthodontic braces or ballpoint pen springs. I couldn't begin to count how many hours I put into my Model 33 when I first got it—as a nonfunctioning junker. And nonfunctioning it was!

The point is that rolling up your sleeves and making a machine labeled GFPO (that's "good for parts only") come up on the air is one of those things that makes ham radio what it is!

```
10 OPEN2,2,3,CHR$(6)
20 GET#2,A$
30 GET B$
40 IFB$="L"THEN B$=CHR$(27)
50 IFB$="@"THEN B$=CHR$(5)
60 IFB$<>""THEN PRINT#2,B$;
70 GET#2,C$
80 IFC$=CHR$(5)THEN30
90 PRINTC$;:GOTO30
```

Fig. 3. VIC-20 or C-64 program. The L in line 40 (IFB$="L") should be a British Pound Sterling sign, but that is not an ASCII character.

Now, as to ASCII-to-Baudot conversion, receiving ASCII sent by hand is no problem on a Baudot machine. Few folks can type at 60 words per minute, although I admit that receiving machine-sent code requires an intermediate buffer. The character set is not really a problem, either. I wrote a simple 6800 program years back that translated ASCII characters into four character groups in Baudot. The printer can zip along, and the full character set can be represented. And, as we have shown in the column over the last ten years or so, it is being done with a multitude of computer systems.

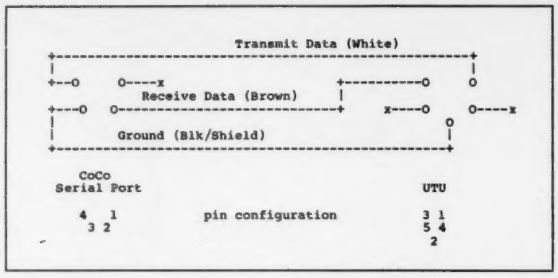

Fig. 4. CoCo hookup.

Thanks for the offer of help, and I look forward to hearing from you again, soon.

And...

Assorted RTTY greetings to John C. Vanderbeck KM7O of Seattle, Washington, and Gerald Meltzer, M.D., of Denver, Colorado. Your interest in the column is appreciated, as always, and I have sent you materials as requested. Hope it is of use.

John E. Wesson WB5AKZ of Lake Village, Arizona, has a HAL ST-6 demodulator and wonders if there is some way to use this terminal unit with a computer. Sure there is. The FSK output from the ST-6 is demodulated RTTY at RS-232-compatible levels. Just hook this where you would hook any RS-232 input and you should be all set. There, now wasn't that simple? They should all be that easy!

Enough for this month. I think we have set a record in the number of systems, machines, and computers mentioned. Don't forget that you can still reach me on CompuServe (75036,2501) or Delphi (MARCWA3AJR) or USPS at the above address. And don't forget that all-important SASE with postal requests. Above all, don't be a "fool" and miss April's RTTY Loop!■

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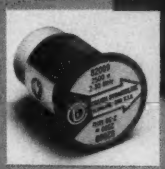

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PROPAGATION

Number 23 on your Feedback card

Jim Gray W1XU
73 Staff

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
ARGENTINA								15	15	15	15	15
AUSTRALIA						40	20	20			15	15
CANAL ZONE	20	40	40	40	40		20	15	15	15	15	20
ENGLAND	40	40	40				20	20	20	20		
HAWAII		20			40	40	20	20				15
INDIA							20	20				
JAPAN							20	20				
MEXICO		40	40	40	40		20	15	15	15	15	
PHILIPPINES							20	20				
PUERTO RICO		40	40	40			20	15	15	15	15	
SOUTH AFRICA									15	15	15	
U. S. S. R.							20	20				
WEST COAST			80	80	40	40	40	20	20	20		

CENTRAL UNITED STATES TO:

ALASKA	20	20						15				
ARGENTINA										15	15	15
AUSTRALIA	15	20				40	20	20				15
CANAL ZONE	20	20	40	40	40	40			15	15	15	20
ENGLAND		40	40					20	20	20	20	
HAWAII	15	20	20	20	40	40	40					15
INDIA								20	20			
JAPAN								20	20			
MEXICO	20	20	40	40	40	40			15	15	15	20
PHILIPPINES								20	20			
PUERTO RICO	20	20	40	40	40	40			15	15	15	20
SOUTH AFRICA										15	15	20
U. S. S. R.								20	20			

WESTERN UNITED STATES TO:

ALASKA	20	20	20		40	40	40	40				15
ARGENTINA	15	20		40	40	40					15'	15
AUSTRALIA		15	20	20			40	40				
CANAL ZONE			20	20	20	20	20	20				15
ENGLAND									20	20		
HAWAII	15	20	20	40	40	40	40					15
INDIA		20	20									
JAPAN	20	20	20			40	40	40			20	20
MEXICO			20	20	20	20	20					15
PHILIPPINES	15						40		20			
PUERTO RICO			20	20	20	20	20	20				15
SOUTH AFRICA										15	15	
U. S. S. R.									20			
EAST COAST		80	80	40	40	40	40	20	20	20		

Sunspot Cycle 22 will produce some new spot groups to benefit propagation. Normal springtime improvements will take place—exceptional worldwide contacts will be possible, even on 10 and 15 meters. Things are beginning to look up for DXers. On many days, however, the geomagnetic field will be unsettled to active, making propagation spotty at best.

MARCH

SUN	MON	TUE	WED	THU	FRI	SAT
1 F–G	2 G	3 G–F	4 F–P	5 P	6 P	7 P
8 P–F	9 F	10 F–G	11 G	12 G–F	13 F–P	14 P
15 P	16 P	17 P	18 P	19 P	20 P–F	21 F–G
22 G	23 G–F	24 F–P	25 P	26 P	27 P–F	28 F
29 F–P	30 P	31 P				

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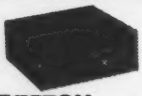

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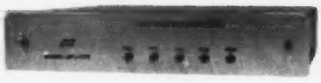

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